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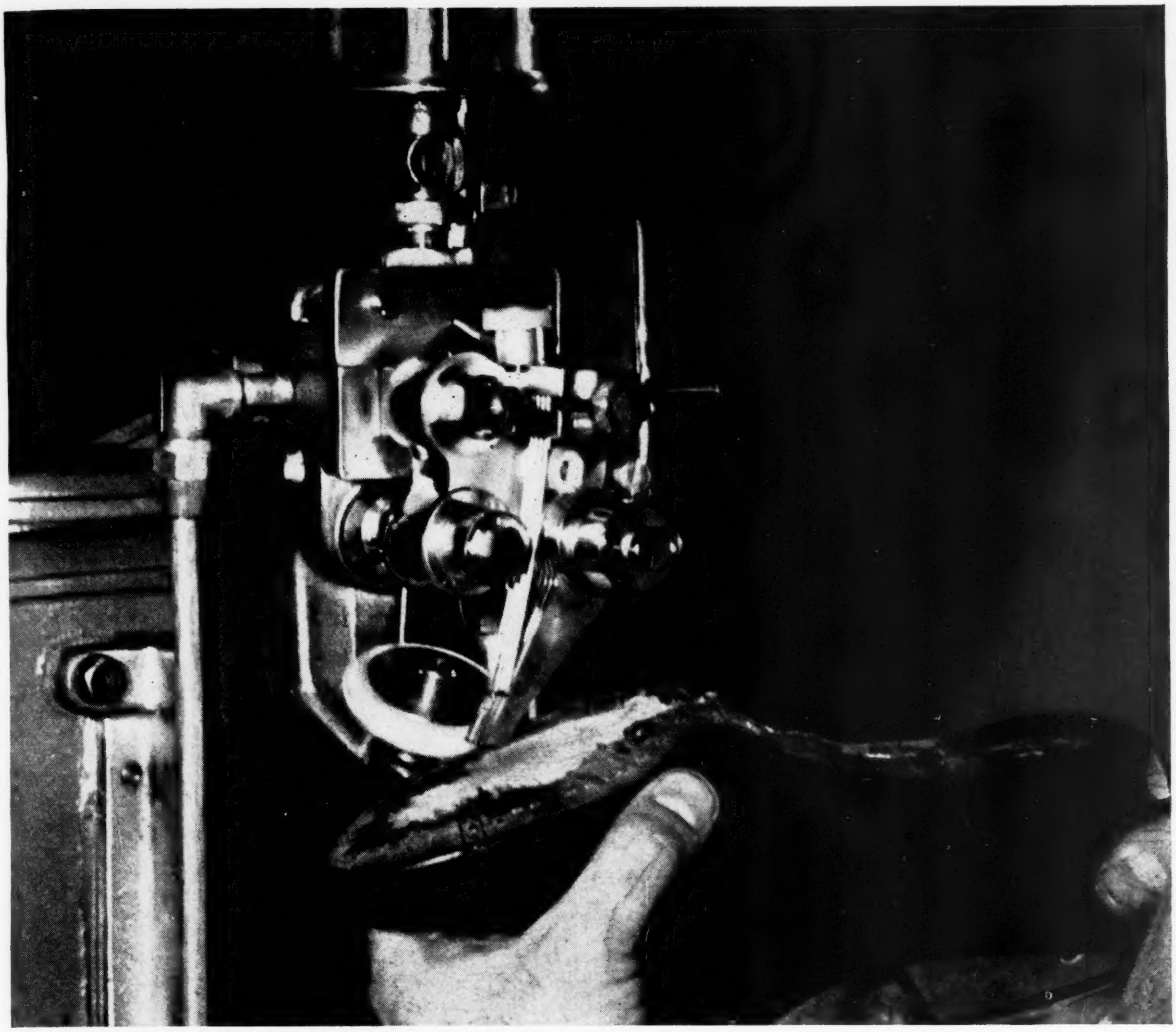

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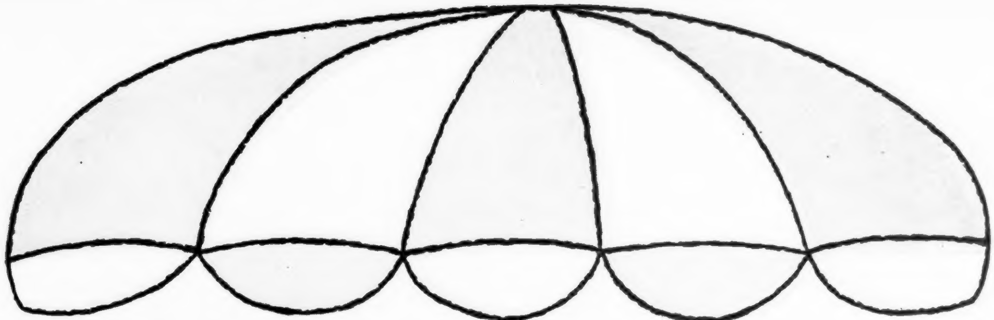

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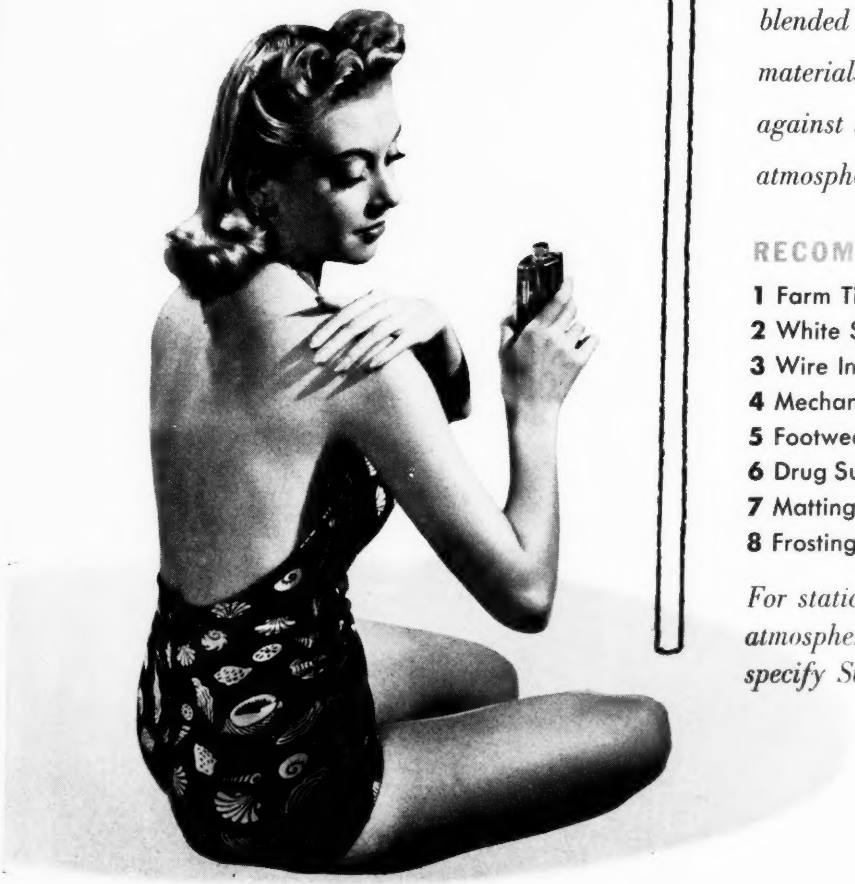

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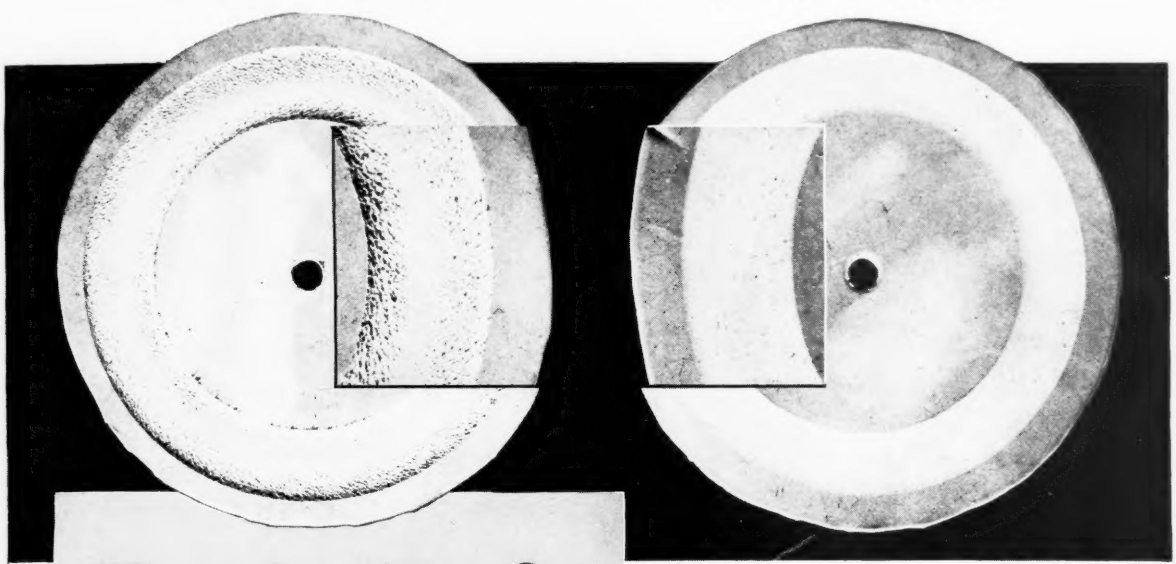

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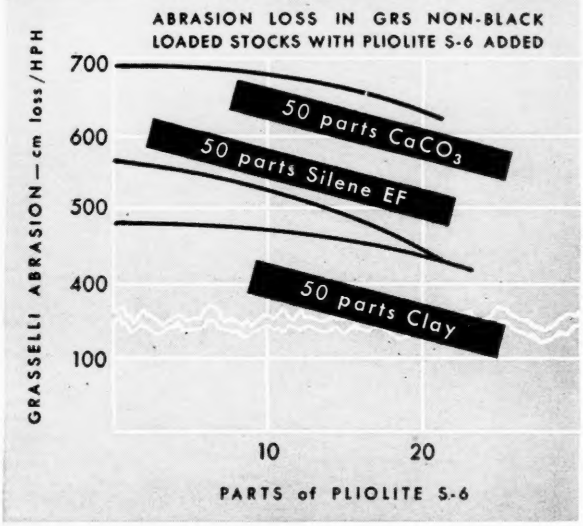

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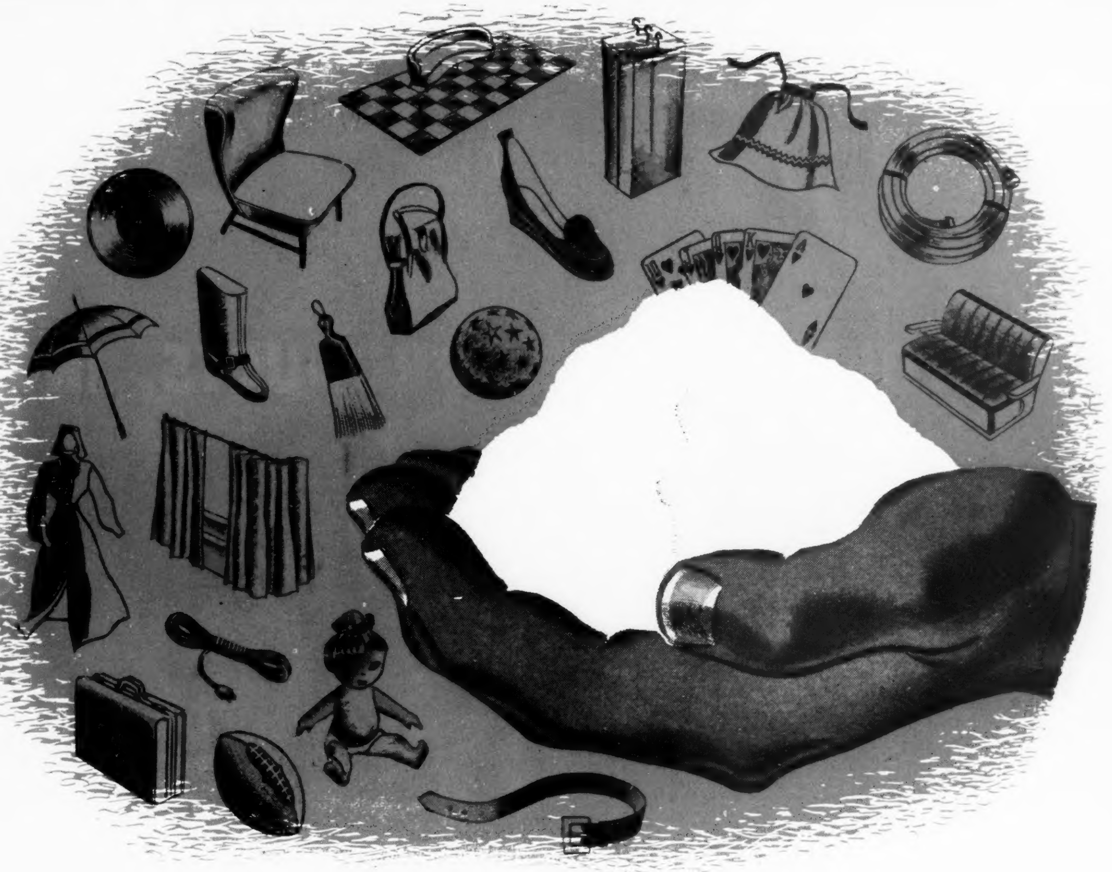

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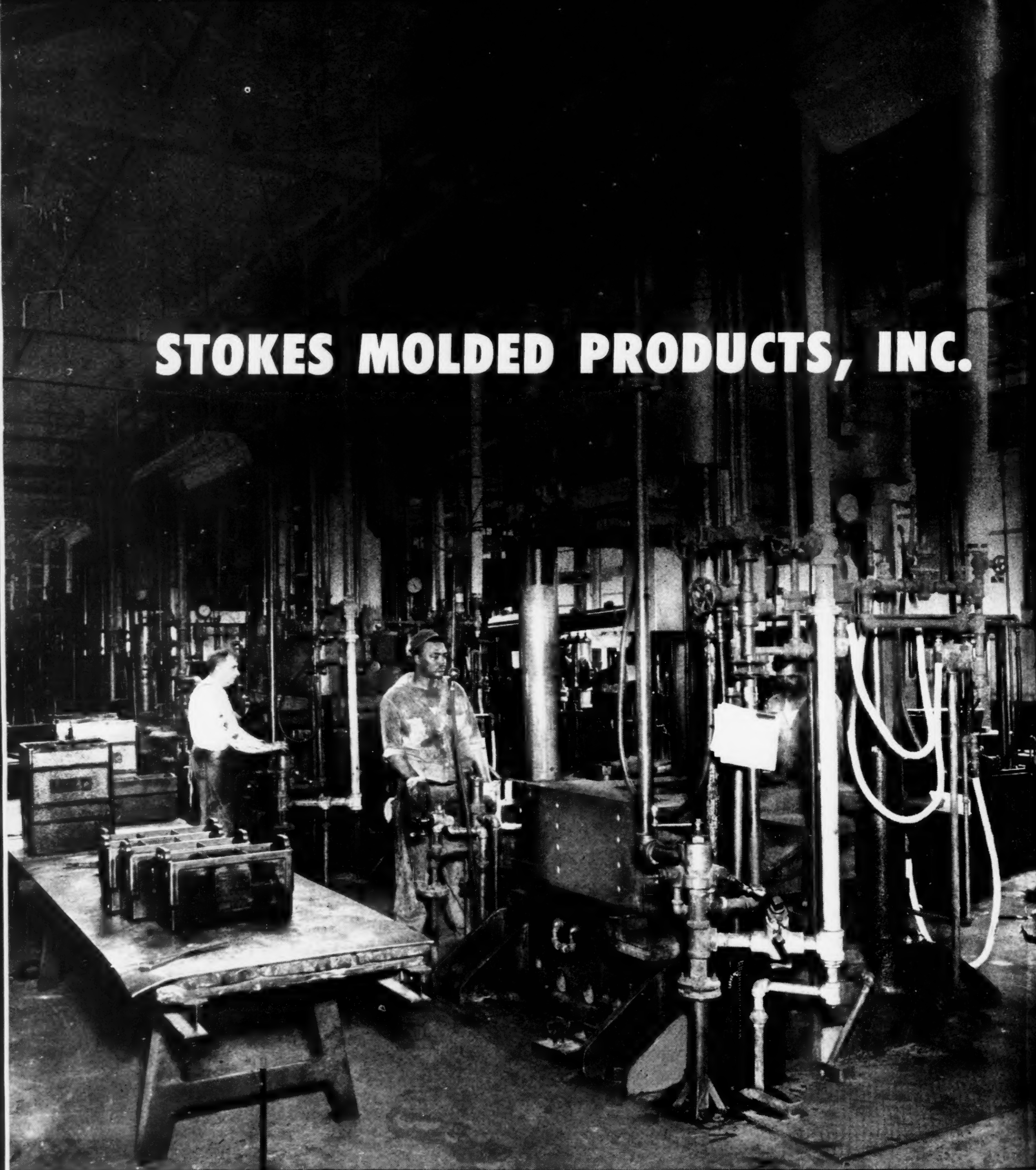

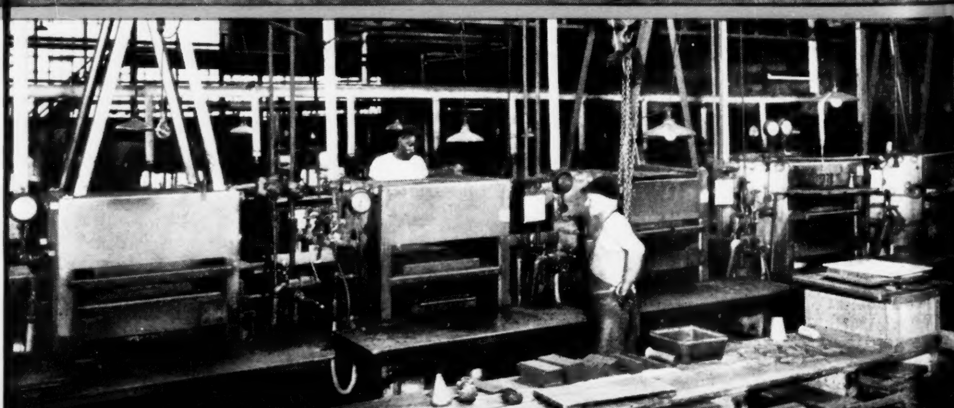

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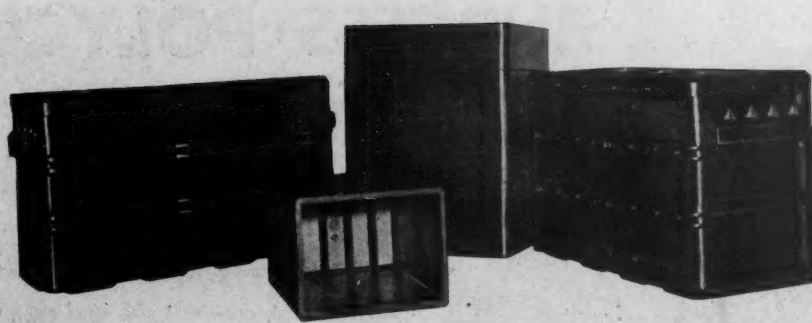

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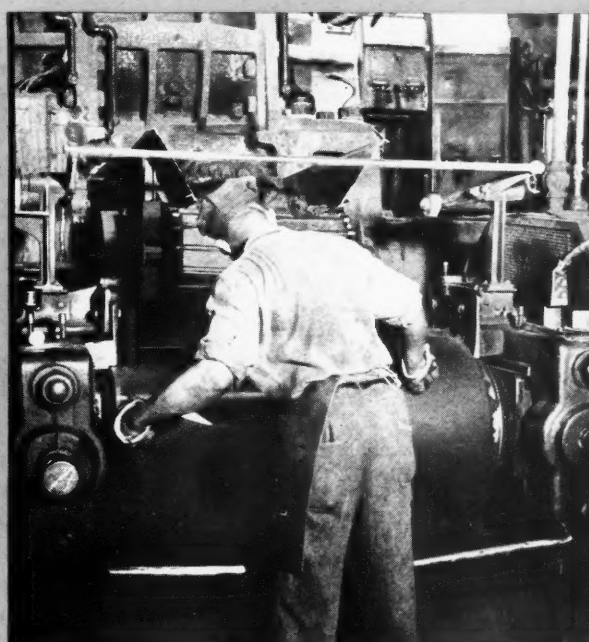

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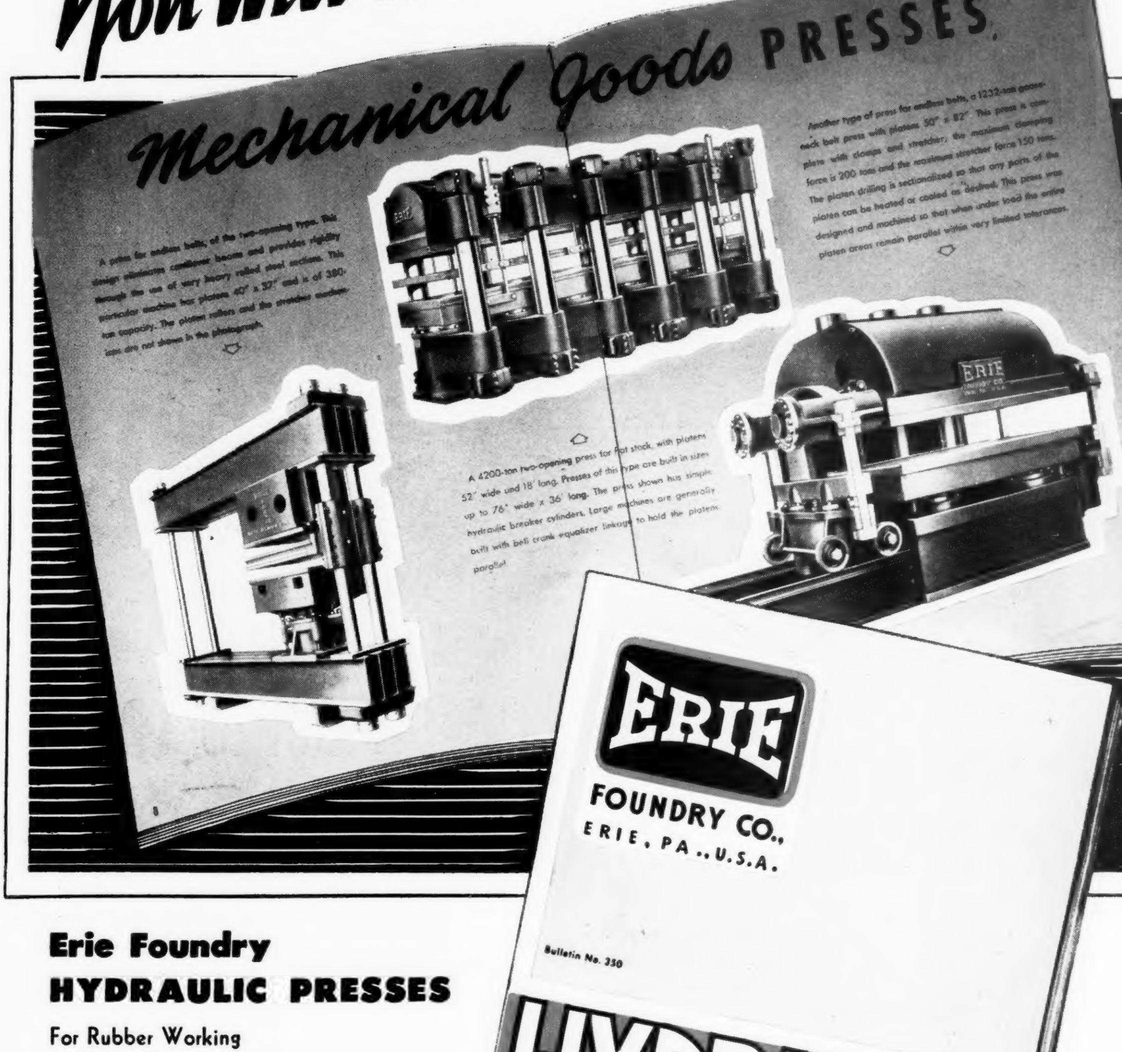

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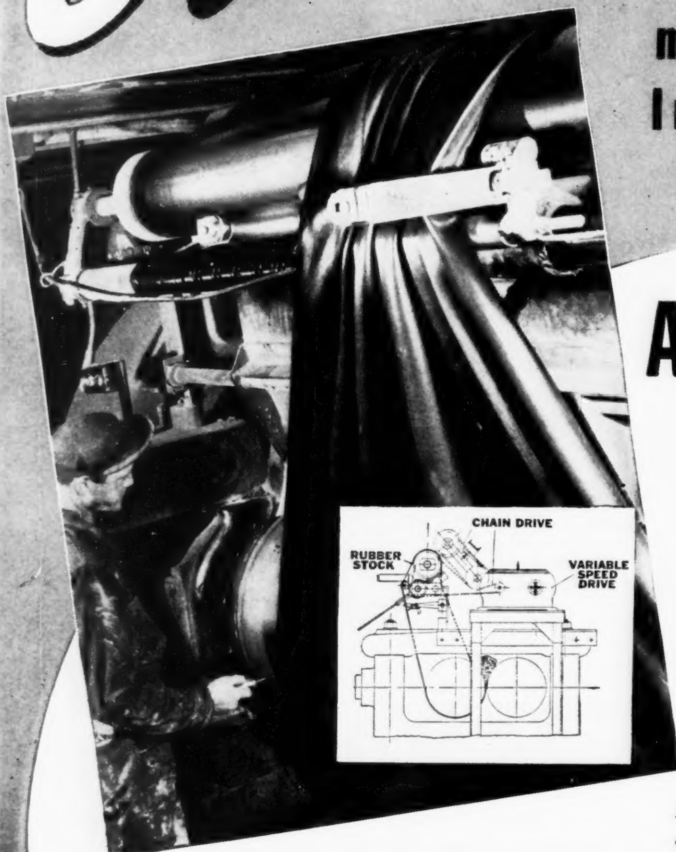

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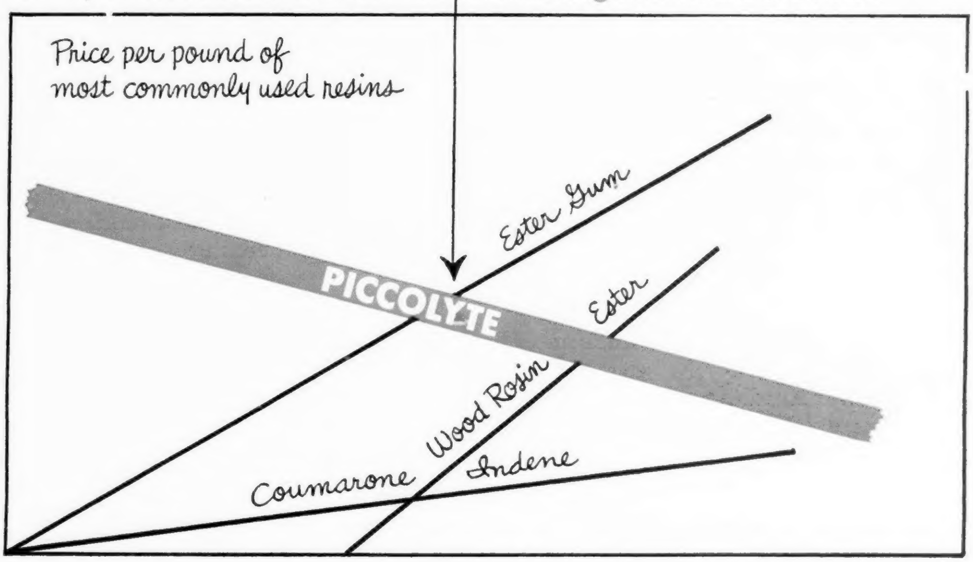

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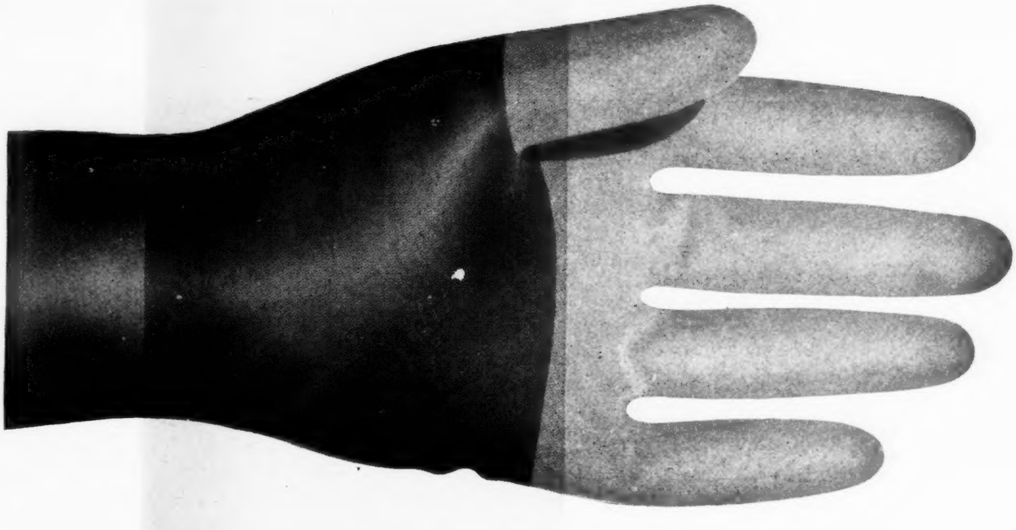

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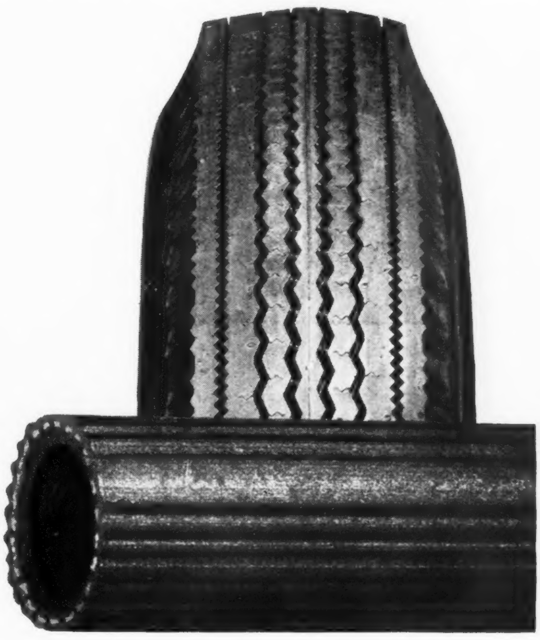

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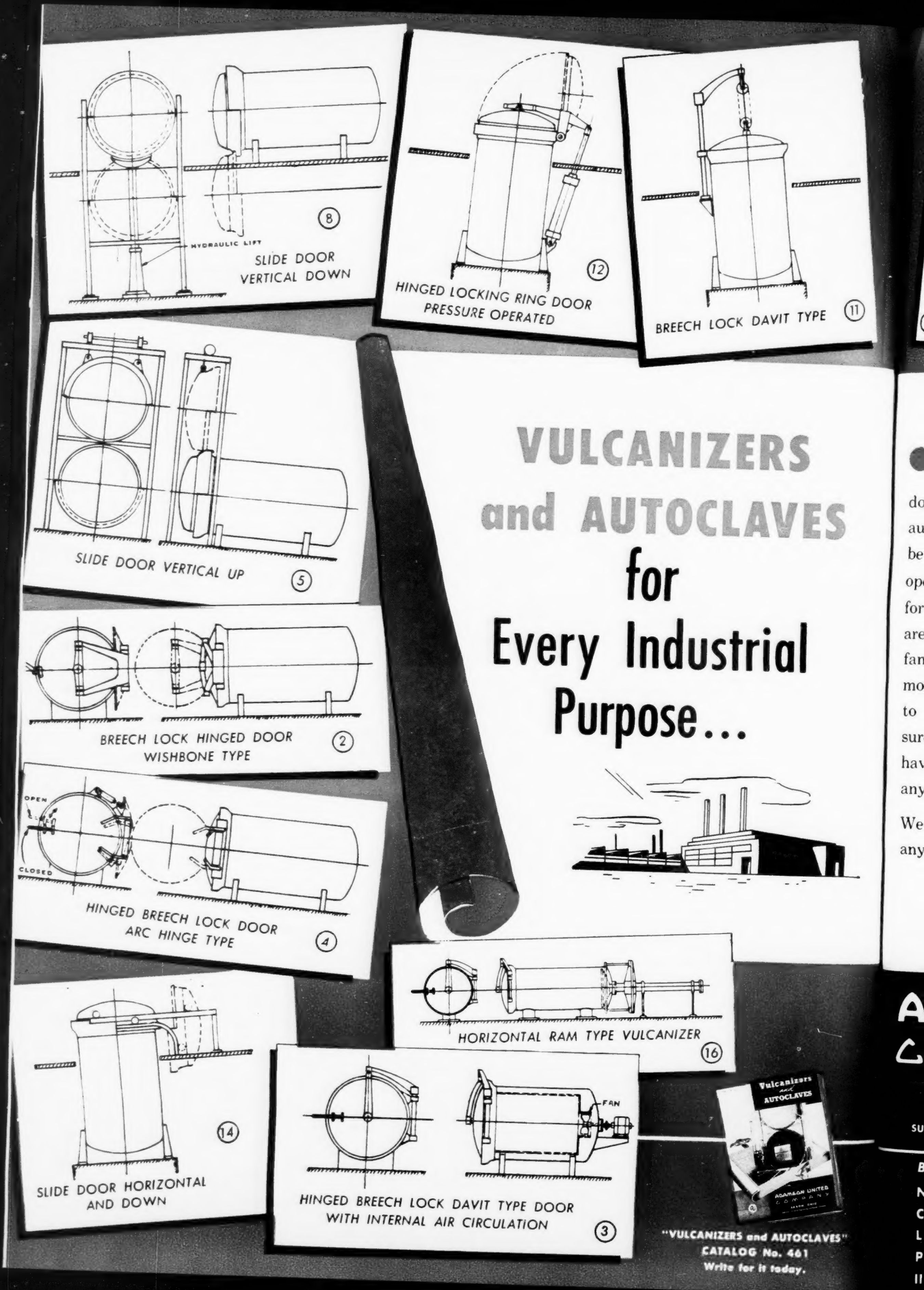
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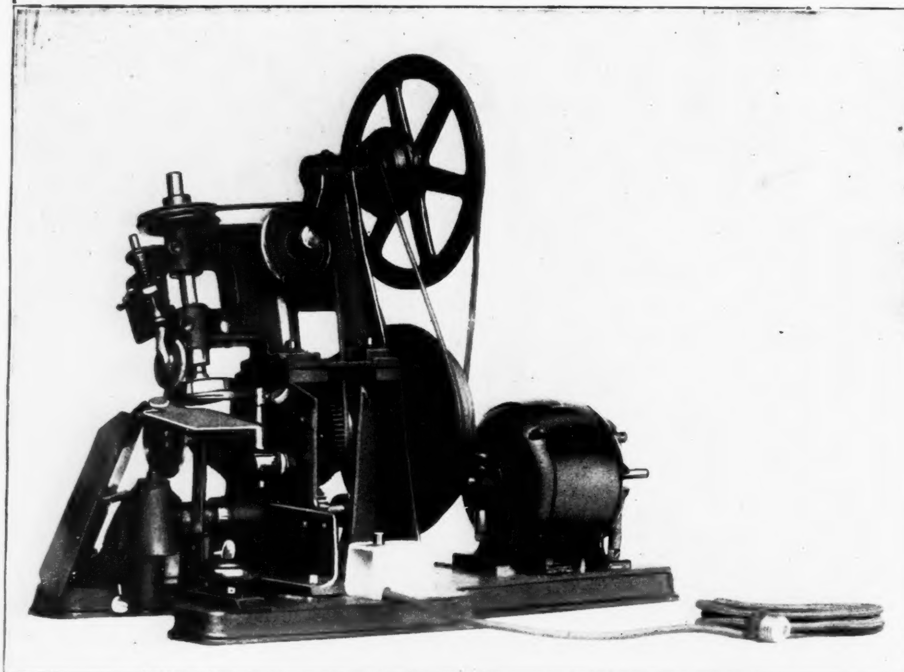

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MARKET REVIEWS

STATISTICS

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INDIA
RUBBER WORLD

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Some Statistics of the Rubber Plantation Industry, With Special Reference to the Smallholder—I

P. T. Bauer[1]

WE ARE pleased to present another article on the rubber plantation industry by the English economist, P. T. Bauer, who has been studying this subject for the past several years. His book, "The Rubber Industry—A Study in Competition and Monopoly," was published in 1948.

This article on the position of the smallholders and their potential capacity for natural rubber production should be particularly timely in view of the results of the last meeting of the Rubber Study Group in London in March where the need of expanding the consumption of natural rubber was brought more sharply into focus by virtue of the progress being made with new types of synthetic rubber. EDITOR.

A WELL-KNOWN paper by the late George Rae[2] presented in comprehensive summary many rubber statistics including some data not available in the form of regular series. Since its publication Dr. Rae's long paper has served as a major source of reference in the rubber industry. The purpose of this present paper is twofold: to offer some comments and corrections on a few points of importance in Dr. Rae's paper, and, secondly, to supplement it with some statistics, some of which have become available only recently. The main points covered are: areas under rubber, especially in the Netherlands India; the supply curve of smallholders' rubber; the general position of the smallholders; and recent trends in natural rubber production and exports.

Areas under Rubber

The plantation rubber industry falls into two fairly clearly defined broad categories: the estate industry, or plantations, operated by European companies and proprietary planters or by Asiatics adopting broadly similar methods; and smallholdings, which are much smaller properties, mostly operated by Asiatic peasants. In common parlance this latter category is widely, but inaccurately referred to as the native industry.

The general characteristics of the estate industry are fairly familiar. They are large, or at least fair sized units, of several hundred or thousand acres each, operated with substantial capital and employing large labor forces, generally in receipt of a fixed daily wage. The major portion of the smallholding acreage is in the hands of peasant proprietors, each with a holding of, say, two to five acres, who work with family labor, occasionally being assisted by outside workers paid on a share basis. In some of the producing territories parts of the acreage officially classed as smallholdings are in larger holdings of 15-100 acres each, usually tapped with the help of outside labor, either on a share basis or in receipt of piece-rates, and paid according to the amount of rubber brought in. This type of property is sometimes known as a medium holding, and the greater part of the acreage is owned by absentees, non-resident businessmen, artisans and tradesmen, or Indian money lenders. Even when the smallholdings or medium holdings rely on outside labor, their dependence is notably less than that of the estates.

The estates, especially the European owned ones, also differ from smallholdings and medium holdings by the adoption of an elaborate hierarchy for the production of rubber. Putting it briefly, cultivation, tapping, manufacture, and packing are carried out by outside laborers; above the laborer stands the foreman, over the foreman the conductor, supervised by the assistant manager, who in turn has a manager above him; on European owned

[1] Gonville & Caius College, Cambridge, England.
[2] "Statistics of the Rubber Industry," *J. Royal Statistical Soc.*, Part II, 1938 (London, England).

estates the further stages in the hierarchy include visiting agents, engineers, and accountants, the agency house, the secretarial firm, the board of directors, and the shareholders. The list is not complete. On smallholdings and medium holdings the identical commodity is produced by the owner and his family, assisted perhaps by a few share tappers or contract tappers, possibly under a Chinese foreman.

The great bulk of the estate acreage is European owned;[3] in Malaya about one-quarter of the estate area is in Asiatic, largely Chinese, ownership. The smallholdings and medium holdings are in Asiatic ownership; in the N.E.I. (where there are few medium holdings) the holdings are practically all in Indonesian hands; elsewhere a varying but generally appreciable proportion is in Chinese or Indian ownership. Apart from the N.E.I. it is, therefore, definitely inaccurate to refer to all smallholders as natives. A certain similarity exists between the larger medium holdings and the Asiatic owned estates in methods of finance and technique of production; but on the whole the distinction between estates and smallholdings has always been fairly clear.

It is often assumed that the areas cultivated by smallholders consist entirely of individual peasant holdings or very small plots. Dr. Rae himself was somewhat incautious in his estimate of the size and the nature of these properties. He stated explicitly that the vast bulk of the properties of less than 100 acres each were in the hands of peasant owners, each with about three acres. This statement disregards the very substantial area of holdings of less than 100 acres each in the hands of Chinese and Indian (principally Chinese) owners in Malaya, Ceylon, North Borneo, Sarawak and Siam. In Malaya about one-half of the smallholding acreage is in the hands of Chinese and Indian owners whose properties are substantially larger than three acres each.[4] In Malaya these properties are known as medium holdings, but they come under the broader category of smallholdings under the official classification, being holdings of less than 100 acres each. In the N.E.I. the smallholdings are almost entirely in the hands of the native inhabitants, and thus for the N.E.I. it is not incorrect to refer to these properties as native holdings.

The statistics of the areas planted with rubber have always been somewhat approximate for most territories, while those relating to the N.E.I. native areas have always been entirely conjectural. Owing to the temporary occupation by the Japanese of the Far East, up-to-date estimates are unobtainable in the more important areas, and the only figures available for most territories give the position at the end of 1940.

Table 1. Acreage under Plantation Rubber in Principal Areas

Territory	End of	Estate	Small-holding	Un-specified*	Total
		(In 1,000 Acres)			
Malaya	1947	1,946	1,399	.....	3,345
N. E. I.	1940	1,567	3,179	....	4,746
Ceylon	1945	359	280	17	656
Siam	1940	....	....	419	419
Indo-China	1942	310	20	2	332
Sarawak	1940	18	222	....	240
India	1944	83	54	15	152
North Borneo	1940	74	59	....	133
Burma	1940	68	43	....	111
Latin America	1944	....	....	†30	†30
Belgian Congo	1946	131	68	....	199
Liberia	1944	77	....	....	77
Nigeria	1946	19	101	....	120
Papua	1943	21	....	....	21

*In Ceylon and India most of the unspecified areas were planted during the Japanese war and are probably in small-holdings. In Latin America the areas under rubber are mostly state-owned or are in the hands of smallholders.
†Estimated.

The following paragraphs summarize briefly some supplementary information which is available on the data presented in the table.

N.E.I. The figure of the N.E.I. native area is the latest official estimate based on the partial results of a survey conducted in 1939-41. Owing to the overriding importance of the N.E.I. native industry in the future of the rubber industry, a very full account is given below of what is known about these areas. The figure in the table refers to an estimate of the areas under rubber at the end of 1940, and there seems to be little doubt that increases in this area were continuously taking place during the occupation.

Malaya. The area under estate rubber decreased by about 7½% during the occupation, according to the 1947 figures from the Rubber Statistical Bulletin. Changes in the smallholding area were in the same direction, but of lesser degree, i.e., a decrease of 2%.

Sarawak. There is some evidence of an appreciable amount of new planting during the occupation.

Siam. The Siamese acreage figure is subject to considerable error. The Siamese authorities used to return figures on the planted areas in that territory to the International Rubber Regulation Committee, but each subsequent figure differed considerably from the previous ones and generally showed large increases. The present planted area is probably of the order of half a million acres, the great bulk of which is in smallholdings.

Other Territories. It is generally believed that there has been a reduction in the planted area in French Indo-China, but no reliable data are available. The Belgian Congo has become a territory of some importance in the rubber industry; rubber planting, both by estates and by native inhabitants, has received much official encouragement in recent years.

The N.E.I. Native Industry

The latest information suggests that the N.E.I. native producers may become by far the most important class of natural rubber producer, and their position thus merits closer examination. Dr. Rae dealt somewhat cursorily with these producers; indeed, his estimate of their acreage has turned out to be mistaken even in the order of magnitude. The basis of the official estimate of this acreage in 1936 (from which Dr. Rae's figures were derived) deserves some review, as the statistical arrangements and their practical results may be found to be of some interest.

In the enormous and sparsely populated areas of Sumatra and Borneo, where more than 99% of the N.E.I. native rubber is produced, there has been no land survey in the native districts; nor has a systematic area survey been undertaken either. As a result, the estimates of the planted areas have always been hazardous and conjectural. Toward the end of the 1920's, when the prospective importance of this class of producer came to be realized, estimates of the planted area ranged from about one to 2½ million acres. These estimates were based mostly on casual surveys, or visits by planters, civil servants, or casual visitors. The rubber-growing residencies of Sumatra and Borneo are several times the size of Great Britain; they are, moreover, sparsely populated, and only a handful of civil servants was in charge of these areas. It was clearly impossible for one or two men to estimate the rubber acreage in a residency like the Western Division of Borneo, which is larger than England and Wales. Besides sheer physical distance, the planting technique

[3] In discussions of the rubber industry reference to European estates usually include the comparatively small American and Australian owned acreage. Although the largest single unit in the rubber industry is American owned, only about 5% of the estate acreage is in American hands.
[4] They probably average about 20-25 acres, and units of this size postulate a different economic organization from holdings of two or three acres each.

of the natives enhances the difficulties of estimating the area under rubber. A large, though uncertain, proportion of the N.E.I. native rubber had been planted as a by-product of rice cultivation. For centuries past the natives of Sumatra and Borneo had cleared plots of land year by year from virgin or secondary jungle, and after taking off one or two rice crops, had allowed the clearing (ladeng) to revert to secondary jungle, which in turn might be cleared again a few years later. This system was retained after the advent of rubber, except that the latter was frequently planted together with the padi. After the second rice crop was harvested, the rubber was left alone until it became tappable. The cost of adding rubber to the existing system of cultivation is negligible in terms of cash or effort. After the padi harvest, the field is abandoned, and young rubber develops among secondary jungle growth and is hardly distinguishable from the surrounding forest.

But while the bases for estimating the native rubber areas of Sumatra and Borneo have always been very slender, some observers (including the N.E.I. authorities) insisted on estimating their extent with a pseudo-accuracy which flew in the face of elementary canons of statistical technique and which actually bordered on the grotesque. The area under rubber was often estimated in a very roundabout way from total exports, available labor, assumptions of the proportion of the total area tapped, the number of tapping days in an area in production, the daily task of tappers, and the very roughly estimated average planting density (the number of trees per surface unit). On the basis of these guesses the number of trees in an area like Western Borneo would be given to the last digit, and the planted area to the nearest acre; while in fact the figures were not known to the nearest 10 million trees or the nearest 100,000 acres.

When international rubber regulation was introduced in 1934, for the first 2½ years of the operation of the regulation scheme, N.E.I. native exports were kept in check by means of a special export duty designed so to depress the internal price of rubber as to make tapping unprofitable. During this period a haphazard tree census was carried out to serve as a basis for the introduction of individual restriction with individual assessments. The field work of the census was entrusted very largely to a small number of unemployed European planters, each of whom had about eight to 10 native tellers under him. About 130 unemployed planters conducted the survey in the whole vast area; they were largely untrained in survey technique and inclined to be sceptical about native methods. The trees were counted by the tellers whose work was checked by the planters; the planting density of each holding was also estimated. Contrary to general belief, the area was not surveyed, and the published figures of the planted acreage were simply arrived at by dividing the number of trees on each holding by the estimated average density and aggregating the results. The count was confined to trees designated by the natives as their own. No attempts were made to detect any concealment. Holdings which in the opinion of the planters or tellers were so neglected as to be incapable of being brought back into tapping were omitted. On the basis of this hopelessly inadequate procedure it was officially claimed that there were 582,365,725 (*sic*) rubber trees in Sumatra and Borneo, and from the estimated average density it was inferred that the area totaled 1,683,202 acres.

The trees were grouped according to several classifications: they were divided into tapped, tappable but untapped, and mature and immature trees; into six different density classes; and into good, moderate, indifferent, and neglected trees, or rather holdings. Neglected referred to areas which could be rendered productive after being cleaned up; as already mentioned, other neglected holdings were excluded. A series of tapping tests was also carried out to correlate planting density and output per tree and per surface unit. The test tappings found, incidentally, that the yield per tree fell with denser planting, but the yield per surface unit rose, a point very frequently overlooked by European observers.

The general average density over the whole of the native area was estimated at 346 trees per acre, and the calculated average output (calculated on the basis of the results of the test tappings) at 545 pounds per acre. This latter figure was conservative, as it assumed 160 tapping days per year, the standard on European estates. Even so, 545 pounds per acre was much in excess of the average estate yields, which in the N.E.I. were around 400 to 450 pounds per acre. At the same time it was stated somewhat surprisingly in the official report on the results of the tree count that only 4.3% of the total native area could be classed as good, with 17.8% fair, 40.3% mediocre, 21.5% poor, and 16.1% neglected; thus mediocre, poor, and neglected holdings accounted for 78% of the total area. These figures were highly paradoxical.

The tapping tests found yields much in excess of expectations and far above the average yield on estates; while the compilers of the census maintained that four-fifths of the area was indifferent or worse. The paradox was heightened when figures were published showing the estimated average yields per acre in the different residencies. These were calculated by applying the average yield per tree of the tapping tests to the average planting density in each residency as computed from the returns of the tree count. These calculated yields ranged from 432 pounds per acre for the residency of Atjeh, to 637 pounds for Djambi, with the overall average of 545 pounds. The average calculated yield in Bengkalis was 555 pounds, with 98% of the area indifferent, poor, or neglected; for Tapanoeli the figures were 533 pounds and 98%; for Djambi, 637 pounds and 81%. On the other hand, in Bengkulen the calculated yield was only 480 pounds though 93% of the area was classed as good or fairly good; thus the better the area the lower the yield.

This much publicized census was obviously of little value; it may have served as an approximate basis of the relative number of trees owned by individual natives—on the assumption that the degree of concealment was the same throughout the native area—and thus furnished adequate data for individual assessments, which were only shares in a fixed quota. The tapping tests were also of some interest, but these were not an integral part of the tree count. A positive disservice was, however, rendered by the authorities in publishing the number of trees and of hectares to the last digit, since this policy suggested to outside observers that a painstaking survey had been taken, whereas actually only a casual and approximate estimate was made. Little publicity was given to the fact that the published acreage figure was purely a calculated result which was, moreover, subsequently found to be quite inaccurate, indeed it was probably only about half the true figure.

Lastly, the opinion that four-fifths of the area was found indifferent or worse was most misleading. The N.E.I. authorities themselves realized the worthlessness of the planters' views on the conditions of the native holdings; the leader of the N.E.I. delegations to the I.R.R.C. made this quite plain in an official memorandum:

"The planters . . . were instructed to classify the gar-

dens according to their general aspect. A certain amount of subjective judgment was inevitable; it must also be borne in mind that those inspectors were all former European planters who judged by estate standards. The Department of Economic Affairs realized that there was no connection between these classifications and the productive capacity of the gardens. This was fully corroborated by the test tappings which showed no correlation between the yield per tree and the classification of the gardens. In fact the gardens overgrown with *blukar* after some clearing showed high productive capacity.[5]

It may well be asked what was the point of publishing the results of the classification, or indeed of undertaking it.

Despite its patent inadequacy this tree census was used as the approximate basis for dividing internally the N.E.I. quota between estates and smallholdings during the second period of regulation from 1939 to 1942. Moreover in 1939-40 the ban on new planting in force since 1934 was temporarily lifted, and producers were allowed to extend their acreages by 5% of the 1938 area. For the N.E.I. natives this 5% was based on the acreage calculated from the tree census. This procedure inflicted substantial loss on the native producers by depriving them of valuable export and planting rights, since the exportable amount under the regulation scheme, as well as the small amounts of new planting permitted under this scheme in 1939-40, were based on registered acreages.

In 1938 the N.E.I. authorities decided to attempt to survey the native areas. By the end of 1941 most of the field work had been completed. The analysis of the results was, however, begun only after the Japanese occupation of the N.E.I., and the only result of this work made public so far is a preliminary estimate based on an examination of part of the data. It is not even known whether the complete data are still in existence. The following official statement has been issued on the results of the survey by the Netherlands India Department of Economic Affairs:

"By the end of January, 1942, some 46% of the areas under native rubber in the Outer Possessions,[6] originally estimated from the 1936 tree count to cover 1,683,202 acres, had been measured. The measured acreage exceeded the previous estimate for the same areas by 90%, and on this basis the Department of Economic Affairs has assessed the total native areas under rubber in the Outer Possessions at 3,179,092 acres."[7]

It is evident that the habit of pseudo-accuracy has not yet been discarded. Although the revised figure is given to the nearest acre, it is still subject to a very wide margin of error, probably running into hundreds of thousands of acres. It is probably still an underestimate of the present acreage, a probability strengthened when the opportunities for planting in the last few years are borne in mind.[8]

Similarly, classification of the holdings by the European planters is still accepted. The Dutch authorities recently tried to estimate the physical potential capacity of the native rubber areas. They applied the classification of the tree census of 1934-36 to the newly calculated native acreage of the residency of the East Coast of Sumatra and deduced that the physical capacity of native rubber there was 21,757 tons, which is actually only 60% of native exports from that residency in 1941 when restriction was still in force. In considering this type of estimate of capacity it must be remembered that the N.E.I. native producers with a planted area of three or four million acres and with their low costs of production are likely to exercise a very large influence on the future of the rubber industry.

It should, however, be noted that nothing is known about the size distribution of these holdings and very little about their dependence on outside labor. The general position of these producers still remains by far the most important gap in the information available on natural rubber.[9]

(To be continued)

[5] "Minutes of the Renewal Sub-Committee of the International Rubber Regulation Committee," page 413. (These minutes are unpublished, but are available at the office of the International Rubber Study Group, London, England.)

[6] In practice Sumatra and Borneo.

[7] *Rubber Statistical Bulletin*, Mar., 1949, p. 38.

[8] The following extract may be of interest from a report of the S. E. Asia correspondent of *The (London) Times* of his journey through Sumatra. It was published in the *Straits Times* on November 4, 1946:
"Especially in South Sumatra, I saw thousands and thousands of acres of small native holdings. Many had evidently been planted not long before the outbreak of war, and the trunks bore no tapping scars at all. Once communications are restored, these small-holdings will produce an enormous and growing volume."

[9] Lack of reliable information on the size and nationality distribution of Malayan smallholdings is also an important lacuna in available knowledge. This information would be required for estimates of the Malayan smallholders' dependence on outside (non-family) labor. As the Malayan smallholdings are individually registered properties, mostly situated in the highly developed parts of the country, this information should have long since been made available by the authorities.

Reports from Australia and New Zealand

Although Australia's rubber goods industry has made considerable headway in the last several years and output of various lines has increased greatly, demand continues far ahead of supply. Output of industrial hose, for instance, has increased from a prewar level of 2,000,000 feet annually to 8,000,000 feet at present, and production of motor tires and tubes is 20% higher, but demand still cannot be met. Production of certain lines is hampered by the need of imported materials, chiefly tire cord and fabric, from America for which dollars are needed; however, it may be noted that production of these items has also been undertaken in Australia and is reportedly on the increase.

Latest news indicates that Australia will have two new cable plants before long. At Tamworth, N.S.W., a plant is being erected for A. W. A. Telcon, Pty. Ltd., formed by Amalgamated Wireless (Australasian), Ltd., and Telegraph & Maintenance Co., Ltd., of England. It is understood that the company is to make a range of plastic insulated wires and cables. The second plant, for the manufacture of paper-insulated power cables, is to be built at Port Kembler, N.S.W., for British Australian Cables, Pty., Ltd. This newly formed company will be financed by Metal Manufacturers, Ltd., and British Insulated Callenders Cables, Ltd.

Despite difficulties in obtaining labor and materials Dunlop Rubber (Australia), Ltd., was able to report a record turnover for its past business year amounting to £7,533,000, with net profit at £535,814. The increased costs of raw materials and the additional costs resulting from the 40-hour week and the Rubber Workers' Award introduced on January 1, 1948, were offset by increased efficiency. The company's policy of gradual decentralization from the major plants at Drummoyne and Montague was continued.

During his recent visit to Australia, J. T. Watts, deputy manager of the I.C.I. Rubber Service Laboratories, Blackley, Manchester, England, spoke on "Recent Developments in Rubber Technology" at meetings of the Victoria and New South Wales branches of the Australasian Section of the Institute of the Rubber Industry.

Before long three tire factories will be operating in New Zealand, and their combined output is expected to cover 90% of the country's requirements in tires. Dunlop Rubber Co. is completing a tire factory at Upper Hutt, (about 20 miles from Wellington), at a cost of about £1,000,000; it will give employment to 400 persons. In Auckland, the Reid Rubber Tire Factory is to be equipped to produce 500 tires daily when in full production. Finally there is the tire factory of the Firestone Tire & Rubber Co. at Christchurch which began operations last year.

The Effect of Die Surface Irregularities upon Results of the Tensile Test for Vulcanized Rubber[1]

C. H. Klute[2]

IT HAS been the experience of this laboratory that tension tests of vulcanized rubbers made in accordance with ASTM designation D412-41 periodically yield unusually low values for the elongation or for both the elongation and ultimate tensile strengths. In general the modulus of the stock is not so affected. In the past some of these aberrations have been attributable to varying techniques used by different operators and to the comparatively crude measurement of elongation used. A recent recurrence of low tensile values caused us to re-examine the tensile test for a new source of trouble.

This investigation revealed that the major source of difficulty was a very small nick on one of the cutting edges of one of the standard ASTM-type "C" dies used to prepare the test pieces. While such a nick would be a likely source of trouble, the present circumstance was a little unusual. In general the cutting implements used in the routine testing are kept in first-class condition, and the die in question appeared to be well sharpened with substantially smooth cutting edges. The nick became apparent only after the *inside surfaces* of the cutting edges were examined with a low power microscope. Particularly, the nick seemed to be the outgrowth of a pronounced tool mark on the inner surface. Examination of the inner surfaces of two dies of recent manufacture made apparent the fact that these surfaces were characteristically tool marked. This condition was true to a lesser extent of a third die which had been made several years ago by a local tool and die maker. Difficulties of this nature have been recognized by others; see for example the discussion given by Schade and Roth[3] during the Symposium on Rubber Testing in June of 1947.

Even though the spurious test results could be returned to the normal values by honing the nicked section of the one die, it was of interest to examine the difference in test results caused by the condition of the die surfaces. To this end the die of local manufacture was honed to improve its inner surfaces and carefully sized to 0.250-inch across the reduced section. This die will be called the special die (die No. 3) in this discussion. The two more recent dies were sharpened, but were not sized, nor were their inner surfaces honed; and they will be referred to in this discussion as the standard dies, Nos. 1 and 2. A variety of natural and synthetic rubber compounds was prepared and tested with the standard and special dies. The results are tabulated below where the tensile strength data are corrected for inaccuracies in the width of the reduced section of the standard dies.

Experimental

The tensile strengths were determined using a Scott Model L-6 rubber tester. The specimens were conditioned 24 hours at 79° F. and 50% R. H. prior to testing. The elongation values were determined in the following manner: A transparent tape made of film-base material and graduated in % elongation to the nearest 25% is clipped on by means of a ladies' bobby pin to one of two crayon marks placed one inch apart on the reduced section of the specimen. The elongation is noted by observing the passage of the second mark beneath the transparent tape. While this method has a number of obvious disadvantages, it is the most practical and convenient method at present available to this laboratory. A trained operator can estimate the ultimate elongation to between 5% and 25% by this method, depending on the type of material under test.

The recipes for the compounds tested are given below:

COMPOUND 2939 (HYCAR OR-25—HOSE COVERING RECIPE)

Hycar OR-25	100
Dibutyl phthalate	15
ZnO	5
Santocure	1.25
AgeRite Powder	1
EPC black	50
Stearic acid	1
Sulfur	1.25

Cure: 45 minutes at 153° C.

COMPOUND 2940 (PERBUNAN 35—HOSE COVERING RECIPE)

Same recipe as for 2939 except Perbunan 35 is substituted for Hycar OR-25. Cure: 60 minutes at 153° C.

COMPOUND 2949 (GR-S TIRE TREAD STOCK)

GR-S	100
EPC black	50
Dutrex 6	10
ZnO	5
Captax	1.50
Sulfur	2

Cure: 60 minutes at 145° C.

COMPOUND 2957 (GR-S HEAVILY LOADED RECIPE)

GR-S	100
SRF black	125
HMF black	30
Dutrex 6	70
Heliozone	1
Paraffin	2
ZnO	10
Captax	1.5
DPG	0.25
Sulfur	4

Cure: 45 minutes at 145° C.

COMPOUND 2385 (NATURAL RUBBER TIRE TREAD STOCK)

Rubber	100
Captax	1
AgeRite Powder	1
MPC black	50
ZnO	5
Bardol B	3
Stearic acid	4
Sulfur	3

Cure: 45 minutes at 145° C.

Results

Table 1 shows a compilation of the tensile data. For each compound tested, three tensile test sheets were identically prepared (except for Compound 2385) and vulcanized in the same mold. From each sheet four tensile specimens were cut. Each of the above sets of four specimens was prepared using one of the three tensile dies described. The four tensile values corresponding to each

[1] Based on a paper presented before the Division of Rubber Chemistry, A. C. S., Los Angeles, Calif., July 22, 1948.

[2] Shell Development Co., Emeryville, Calif.

[3] "Developments and Improvements in Methods of Stress-Strain Testing of Rubber" in "Symposium on Rubber Testing," Special Technical Publication No. 74, p. 27. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

TABLE 1. COMPILATION OF TENSION TEST DATA

Die No. 1 Tens. Str. P.S.I.	Die No. 1 Elong. %	Die No. 2 Tens. Str. P.S.I.	Die No. 2 Elong. %	Die No. 3 Tens. Str. P.S.I.	Die No. 3 Elong. %	Δ_{1-2} P.S.I.	Δ_{3-1} P.S.I.	Δ_{3-2} P.S.I.
Standard Dies				Special Die		Differences		
Compound 2939 (Hycar OR-25 Hose Covering Recipe)								
2826	550	2804	550	3060	575	+22	+134	+156
2761	525	2718	535	2900	575	+43	+139	+182
2544	500	2631	500	2860	550	−87	+316	+229
2478	500	2587	550	2840	525	−109	+362	+253
2652	519	2685	534	2915	556	(Average)		
Compound 2940 (Perbunan 35 Hose Covering Recipe)								
3891	700	3848	675	4180	725	+43	+289	+332
3805	675	3718	700	4120	750	+87	+315	+402
3587	665	3674	675	3920	700	−87	+333	+246
3587	650	3152*	600	3920	675	+435*	+333	+768*
3718	673	3598	663	4035	713	(Average)		
Compound 2949 (GR-S Tire Tread Stock)								
2891	550	2935	550	3080	600	−44	+189	+145
2804	550	2804	550	3020	600	0	+216	+216
2804	525	2783	500	3000	575	+21	+196	+217
2761	535	2565*	500	2980	575	+196*	+219	+415*
2815	540	2772	525	3020	588	(Average)		
Compound 2957 (Heavily Loaded GR-S Recipe)								
1587	225	1565	250	1560	250	+22	−27	−5
1587	225	1544	250	1500	250	+43	−87	−44
1544	225	1478	215	1480	225	+66	−64	+2
1544	225	1435	225	1460	235	+109	−84	−25
1566	225	1506	235	1500	240	(Average)		
Compound 2385 (Natural Rubber Tire Tread Stock)								
3739	450			4200	475		+461	
3674	425			3980	475		+306	
3609	450			3920	475		+311	
3522	425			3720	450		+198	
3636	438			3955	469	(Average)		

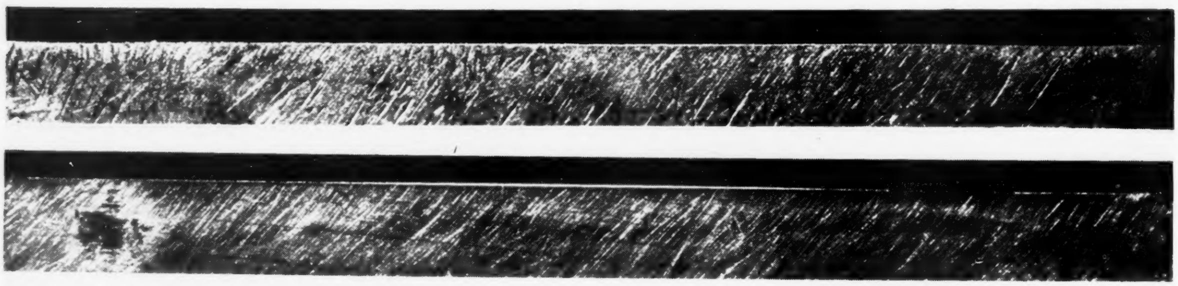


Fig. 1. Inner Surfaces of Cutting Edges of Tensile Test Dies: *(Top)* Photograph of the Standard Die; *(Bottom)* Photograph of the Special Die

compound and tensile die were tabulated in order of decreasing tensile strength within each set down the columns of Table 1, and the three sets were compared with each other for each compound across the rows. Across each row, three differences were obtained: namely, the difference between corresponding tensile strengths obtained with die No. 1 and die No. 2, the difference between those of die No. 3 and die No. 1 and between those of die No. 3 and die No. 2. In such an array the first mentioned difference, designated Δ_{1-2} in the table should be influenced only by the normal experimental error; whereas the other differences, Δ_{3-1} and Δ_{3-2}, respectively, should be affected as well by the differences in the die surfaces. Thus, if the somewhat polished surface of die 3 promoted higher tensile strengths, Δ_{3-1} and Δ_{3-2} should be consistently and significantly larger than Δ_{1-2}. Examination of Table 1 shows that this condition is apparently so in every case except compound 2957, which was a very heavily loaded GR-S recipe and not a typically rubbery material at all. Although the data for compound 2385 are incomplete, the data for Δ_{3-1} are in the same range as for the other compounds except the heavily loaded GR-S compound. The values which bear an asterisk are values based upon tensile strengths which are unusually low for the compound. Perhaps these tensile strengths should have been discarded, but there was no obvious reason for doing so. In Table 2 is a condensation of the data of Table 1, which gives results for the ultimate elongations as well as for the tensile strengths computed as per cent. difference. Especial care was taken in these determinations; hence the per cent. differences recorded may be somewhat less than those normally associated with routine rubber testing.

If there were no effect due to the rough inner surfaces of the standard dies, one would expect no greater difference between the special and the standard die than between the two standard dies as far as the elongation and tensile strength are concerned. Except for the heavily loaded GR-S composition, a higher tensile strength and elongation were obtained with the special die on each of the compounds tested. The differences observed indicate an effect is being felt. The photographs of Figure 1 show enlarged sections of the inner die surfaces.

To supplement these results, some experiments were performed which were intended to give us some insight into the nature of the surfaces of die-cut rubber specimens. It was first intended to study the inner surfaces of the dies used to cut the specimens, by means of the Brush

surface analyzer,[4] but it was immediately apparent that the sensitive element of this instrument could not be made to travel along the inner die surfaces parallel to the cutting edge, and it was further apparent that the irregularities in this surface were not uniquely reflected in the irregularities of the die cut surfaces. It was therefore decided to examine the rubber surfaces themselves. Since the Brush surface analyzer depends for its operation upon a sharp jewel stylus moving across the hills and valleys in the surface, it follows that the surface to be so examined must be considerably harder than the die cut rubber surfaces.

TABLE 2. COMPARISON OF TENSILE TEST DATA — COMPARISON OF MEAN TENSILE STRENGTHS

Compound	Average Standard Dies	% Diff. btw. Die 1 and Die 2	"t" Value	Average: Special Die	% Diff. btw. Special and Standard Die	"t" Value
2939	2669	−1.2%	0.34	2915	+8.8	3.35*
2940	3658	+3.3%	0.70	4035	+9.8	2.95*
2949	2793	+1.6	0.53	3020	+7.8	3.95*
2957	1536	+3.8	1.85	1500	−2.3	1.17
2385	3636	....	....	3955	+8.4	2.93*
		Comparison of Mean Elongations				
2939	527	−2.8		556	+5.4	
2940	668	+1.5		713	+6.5	
2949	533	+2.8		588	+9.8	
2957	230	−4.4		240	+4.3	
2385	438	....		469	+6.8	

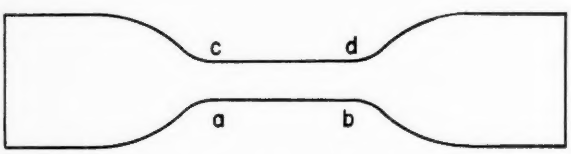
The percentage differences between die one and die two were computed from the difference (Die 1-Die 2) and between Special and Standard dies from the difference (Special Die-Standard Die).

The "t" values are calculated according to the statistical "Student t test." Values marked (*) are statistically significant. The likelihood of these differences occurring by chance is less than 1 in 20.

Experimental

To circumvent the difficulty presented by the softness of the rubber specimens, replicas of the rubber surfaces were prepared by placing representative rubber specimens cut with each of the tensile dies into a shallow tray fashioned from aluminum foil and coated with cellulose acetate (as a release agent), pouring a casting resin about the edges of the specimens, and curing the resin. This experiment required a casting resin which had a sufficiently low viscosity so that bubbles of air inadvertently formed would rapidly rise to the surface and which would give a minimum dimensional change on curing. It goes without saying that the resin must not adhere to the rubber on curing. The aluminum tray and rubber specimens were subsequently pulled from the resin, and the casting was sawed along what corresponded to the axis of each specimen, thereby exposing the replicas of the die-cut surfaces for examination.

[4] Manufactured by the Brush Development Co., Cleveland, O.



Template of Standard ASTM Rubber Die C (Lower Case Letters Denote the Approximate Positions at Which Profiles Were Obtained on the Replicas)

Results

Since the Brush surface analyzer magnifies a portion of the surface 0.060-inch in length in each determination, four areas along what corresponded to the reduced section of the rubber test specimen were examined for each test specimen replicated. These were located on either side of the specimen near opposite ends of the reduced section.

The experimental data given by the surface analyzer are a highly magnified profile of the examined surface which is recorded graphically on a chart paper. The 12 profiles were examined visually for what readily apparent data they contained: namely, the maximum irregularity recorded (i.e., the distance from the top of the highest peak to the bottom of the lowest valley in the 0.060-inch path traced) and whether the irregularities in the surface were sharp or rounded at their tops and bottoms. These data are given in Table 3.

TABLE 3. PROFILE MEASUREMENT DATA

Die No.	Position	Maximum Irregularity (in Ten-Thousandths Inch)	Remarks
1	a	3.6	Die with surfaces "as received."
	b	4.0	Sharp irregularities.
	c	3.6	
	d	4.7	
	Average	4.0	
2	a	3.0	Die with surfaces "as received." Irregularities significantly smaller than die No. 1, but just as sharp.
	b	2.6	
	c	3.2	
	d	2.5	
	Average	2.8	
3	a	3.0	Die surfaces honed. Irregularities smaller than either No. 1 or No. 2 and significantly rounded at the apeces.
	b	2.9	
	c	1.1	
	d	2.0	
	Average	2.3	

The lower case letters designate the positions of the measurements. In Figure 2 is shown the most pro-

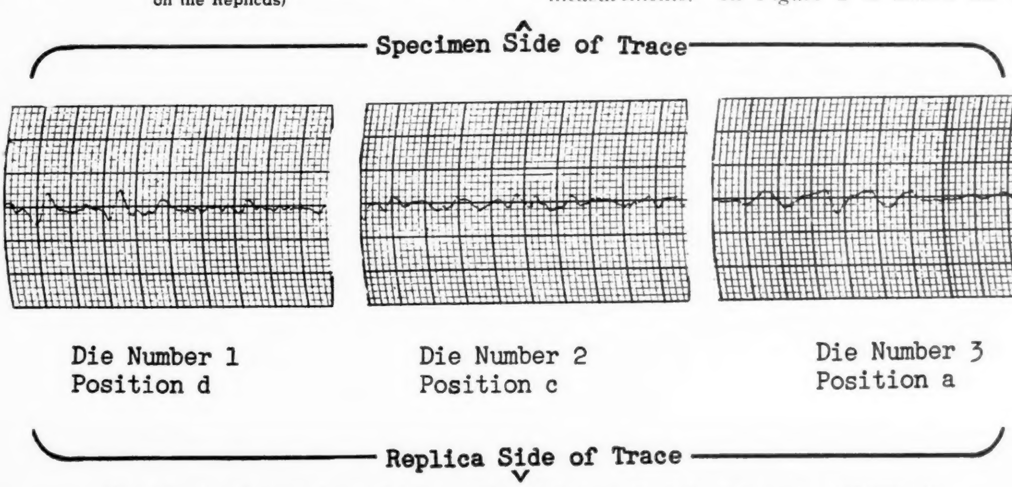


Fig. 2. Surface Analyzer Traces Taken upon Replica Surfaces (Each Small Square = 1/10,000-Inch)

nounced irregularities measured on each of the three dies. The traces correspond to the positions: die No. 1-d, die No. 2-c, and die No. 3-a, which gave maximum irregularities of 0.00047-, 0.00032-, and 0.00030-inch, respectively. These traces were included to demonstrate the differences in sharpness of the peaks and valleys between the honed die and those in the "as received condition." It is at once apparent that the observed differences in maximum irregularity are small; more significant, we feel, may be the comparative sharpness of the surface irregularity.

Discussion

The above measurements are not free from a variety of errors which should be mentioned. Almost any organic casting resin may be expected to exhibit a small dimensional change on curing, and any such change would appear as a uniform expansion or contraction of the replica surface relative to the original. The greatest experimental uncertainty lay in the softness of the fully cured resin relative to the jewel stylus of the surface analyzer. The parts of the surface analyzed were examined under a magnification of 12 diameters immediately afterward to ascertain the extent to which the stylus had scratched the replica. Although the stylus had left a mark upon the replica, the mark was certainly slight compared to the irregularities which were characteristic of the surface. The surface analyzer was allowed to traverse its 0.060-inch path several times to observe whether or not the profile was repeated on successive excursions over the path. The fact that the path was repeated identically on two excursions would indicate that scratching did not progress rapidly. With similar surface replicas deterioration has been noted after about five or seven excursions of the analyzer. In fact the profiles indicated numerous reasonably sharp peaks where die No. 1 and die No. 2 were used. Carfeul inspection reveals a slight rounding of the tops of the peaks, but the extent to which this is observable is gratifyingly slight. One would therefore conclude that insufficient scratching occurred to invalidate the experimental results. It is unlikely that the measurements were taken upon portions of the replica which were not representative of the nature of the surface since visual examination of the replicas showed them to be uniformly marked along the reduced section of the specimen.

Experiments with Lapped Die Surfaces

Some time after these experiments were conducted, it became of interest to know whether the improvement observed upon honing the inner die surfaces could be extended by still further improving the die surfaces. To this end a tensile die was constructed which could be separated along a line corresponding to the longitudinal axis of the specimen. The cutting edges were tapered in cross-section, and the outside surfaces thereof were buffed to a smooth surface. This construction allowed the inner die surfaces to be mated to a cast-iron lap so that sharpening of the cutting edges could be accomplished by lapping the inner die surface with a diamond lapping compound. The surface thus produced was smoother than that produced by honing the die surfaces with an oilstone. When the cutting edge was inspected under a low power microscope, it was apparent that even this cutting edge required a slight final polish with a hard Arkansas stone. The cutting edge finally produced approached razor sharpness. A brand new tensile die of recent manufacture was honed with an oilstone until the tool marks on the inner die surfaces were removed and the surfaces were in substantially the same condition as those of the special die of the first section of this paper. Six additional sheets of Compound 2939 (the Hycar OR-25 Hose Covering Recipe) were prepared from a new mix, and 11 specimens were cut with each of the two dies. The values of the tensile strength of the specimens corresponding to each die are listed in Table 4 in descending order. As with previous data, these values were corrected for inaccuracies in the widths of the reduced sections of the dies. The differences between values on the same line are listed in the third column. The value of Student's t is computed from these differences to indicate whether they are statistically different from zero. Since the value of t so obtained (6.8) is statistically significant at even the 0.1% level, the difference of 3.4% between the mean values is easily measurable when two sets of 11 values are compared. The lapped die actually gave the lowest results of the two. The difference between the two dies is small, and the values obtained with either of them agree very well with the tensile strength of Compound 2939 obtained using the special die of the first experiments.

TABLE 4. COMPARISON OF TENSILE TEST DATA OBTAINED USING A DIE WITH INTERIOR SURFACES HONED AND USING A TENSILE DIE WITH SPECIALLY LAPPED SURFACES

Compound 2939 (Hycar OR-25 Hose Covering Recipe)

	Die 4—Honed Cutting Edges P. S. I.	Die 5—Lapped Cutting Edges P. S. I.	Difference x
	3409	3125	284
	3285	3060	227
	3037	3000	35
	3016	2900	116
	3016	2860	156
	3016	2820	196
	2996	2800	196
	2954	2780	174
	2768	2740	28
	2748	2720	28
	2727	2680	47
Average:	2982 p.s.i.	2883 p.s.i.	

$$\text{STANDARD DEVIATION } \sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}} = 89.6$$

$$t = \frac{\bar{x}\cdot\sqrt{n}}{\sigma} = 6.8$$

Conclusion

It would seem that carefully honing the inner die surfaces to remove tool marks produces a die which will give uniformly high tensile strength values. Apparently a variability of about 3% can be expected between specimens cut from two satisfactorily sharp dies. Referring to Table 2, one notes that differences of this order are not in general statistically significant where only four specimens per sample are tested (The standard method of testing vulcanized rubber, ASTM designation D412-41, requires that only three specimens per sample be tested).

This being the case, there is little to be gained by going to sharpening techniques more elaborate than the careful use of a suitable oilstone.

The author is indebted to Frank M. McMillan of these laboratories for his interest in and encouragement of this work.

"How the Innocent Suffer!" British Rubber Development Board, Market Bldgs., Mark Lane, London E.C.3, England. 16 pages. Intended for farmers and agricultural workers, this booklet illustrates and describes some of the causes of premature failure of tractor tires, and gives simple instructions for preventing such failures.

GR-S and Natural Rubber with Improved Processing Qualities[1]

Arnold R. Davis,[2] Arthur C. Lindaw,[2] and Ralph A. Naylor[2]

IT HAS recently been shown[3], and it is generally agreed, that during the past few years considerable improvement has been made in the processing characteristics and quality of GR-S. Some of the newer or special types of GR-S are difficult to process, however, largely because of their high viscosities. Even the GR-S made at 41° F. appears to offer problems in processing. These may be due to the molecular structure of the "cold rubber" which undoubtedly contributes to the reported[4] high temperatures developed during processing.

Since the latter part of 1945 the volume of natural rubber consumed in the United States has continually increased. As before World War II, most of this rubber still requires plasticization in some way to facilitate the manufacture of many rubber products.

In a previous paper one of the authors[5] discussed in considerable detail the action, in dry GR-S and in dry natural rubber, of o,o'-dibenzamidodiphenyldisulfide or 2,2'-dithiobisbenzanilide now known as Pepton 22. At that time it was stated that work indicated the possibility of adding this catalytic plasticizer to the GR-S latex or to natural rubber latex prior to coagulation. The coagulated polymers might be washed and dried as usual. The GR-S and natural rubber prepared in this way with the desired amount of plasticizer would then be ready for plasticization by the usual hot mastication methods.

The present paper presents some data illustrating the preparation of GR-S and natural rubber containing Pepton 22 for convenient and effective plasticization when these rubbers are subjected to hot mastication. Since most of the modern factory-size masticating equipment gives only hot mastication (temperatures of about 250° F. and higher) with GR-S and particularly with some of the newer types of GR-S, as well as with most types of natural rubber, only comparisons of hot mastication of the polymers with and without Pepton 22 are shown.

Experimental Methods

In much of the early work on adding this catalytic plasticizer to latex a dispersion of the composition shown below was used:

PEPTON 22
Dispersion

Pepton 22	50 parts by weight
Daxad #11	2 parts by weight
Water	48 parts by weight
Ball milled for 17 hours.	

Later dispersions of Pepton 22 in other concentrations and prepared by other methods were used as indicated in the tables.

The antioxidant (phenyl-β-naphthylamine) for the GR-S was added to the GR-S latex in the form of a water dispersion prior to coagulation to give the ratios of antioxidant as shown in the tables.

For GR-S some work was done with alum coagulation, but most of the work was done with the regular salt-acid coagulation. The coagulated GR-S was washed and then dried for three hours at about 190 to 200° F.

In the case of natural rubber 60% latex was diluted to about 15% rubber content, followed by addition of the Pepton 22 dispersion and coagulation with dilute acetic acid. The coagulated rubber was washed by soaking in water before and after creping until the water was no longer acid to litmus. The creped rubber was dried at temperatures of about 110 to 200° F. for 0.75-hour to 1.5 hours.

Hot mastication was carried out in a midget Banbury with batch sizes from 180 to 300 grams of polymer and temperatures as indicated in the data. The batches from the Banbury were creped twice through a six- by 12-inch laboratory mill at 120-130° F. to facilitate cooling.

Plasticity determinations were made after the polymers had been cooled to room temperature with the Williams plastometer in some cases and with the Mooney viscometer in other cases, both at 212° F. The Williams plasticity values are shown as the Williams three-minute "Y" at 212° F. in mils (0.001-inch) and represent the thickness of a two-cubic centimeter pellet after three minutes' compression at 212° F. under a load of 5,000 grams. The one-minute recovery at 212° F. is the increase in thickness of the pellet one minute after removal of the 5,000-gram load. The "Y" values and recovery figures are the averages of at least two determinations. Lower "Y" values indicate softer or more plastic polymers. The recovery figures follow the trend of the "Y" values except where gel formation in the polymers is encountered.

The character of the GR-S before and after mastication was determined by the procedures for the determination of gel, swelling index, and dilute solution viscosity of Mullen and Baker.[6]

Cut growth tests were run on the DeMattia flexing machine at 375 flexes per minute with angles of bend as shown in the tables.

Heat build-up tests were run with the Goodrich flexometer operated under constant deformation of 0.1-inch for three minutes and with continuous load for 12 minutes.

Data and Discussion

GR-S (Made at 122° F.)

Figure 1 shows some results obtained on adding Pepton 22 to a sample of GR-S latex prior to salt-acid coagulation. In comparing the plasticity values after drying, it appears that the 1.5% of Pepton 22 gave a slight softening during the drying operation. From the plasticity values after hot mastication it is evident that the GR-S containing the Pepton 22 shows a much greater decrease in the Williams three-minute "Y" value (at 212° F.) or increase in softness than the GR-S with no Pepton 22.

Somewhat similar results were obtained with a sample of another lot of GR-S latex (Type II) using alum coagulation, as shown in Figure 2. In this case, however, there was no softening during the drying of the GR-S containing Pepton 22.

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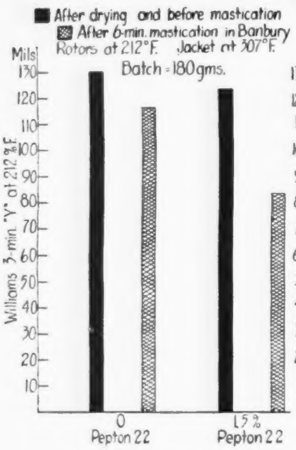
[1] Presented before the Division of Rubber Chemistry, A. C. S., Detroit, Mich., Nov. 10, 1948.
[2] American Cyanamid Co., Stamford, Conn.
[3] "Comparisons of Natural and Butadiene-Styrene Rubbers." R. P. Dinsmore and J. H. Fielding, India RUBBER WORLD, Jan., 1949, p. 457.
[4] W. H. Shearon, Jr., J. P. McKenzie, and Martin E. Samuels, *Ind. Eng. Chem.*, 40, 5, 769 (1948).
[5] "Plasticizing GR-S and Natural Rubber." Arnold R. Davis, *Ibid.*, 39, 94 (1947).
[6] War Production Board, O.A.R.D., General Report No. 8 (Feb., 1944).



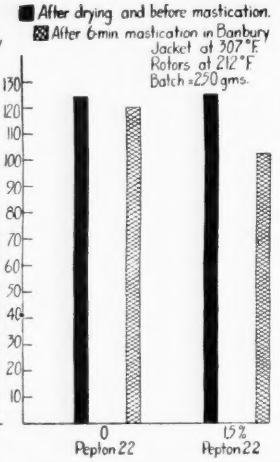


Fig. 1. Pepton 22 in GR-S—Added to Latex before Coagulation (Salt-Acid)

Fig. 2. Pepton 22 in GR-S—Added to Latex before Coagulation (Alum)

From these results it is apparent that the water insoluble *Pepton 22* may be dispersed in water and added to GR-S latex prior to coagulation, followed by washing and drying, and give a GR-S which can be plasticized to a greater extent with Banbury mastication than the regular GR-S.

TABLE 1. PEPTON 22 IN GR-S—ADDED TO LATEX BEFORE COAGULATION

(Salt-Acid Coagulation) Compound	3	4	5
GR-S polymer from latex	100	100	100
Phenyl-Beta-naphthylamine from disp.	1.5	1.5	0
Pepton 22 from disp		1.5	1.5
Wt. of rubber=to 100 parts of regular GR-S	100	101.5	100
Dried three hours at 190 to 200° F.			
	Plasticity Tests—after Drying		
Williams 3-min. "Y" at 212° F.-mils	119	114	71
1-Min. recovery at 212° F.-mils	40	31	20
	Character of GR-S after Drying		
Gel, %	0	0	0
Dilute sol. viscosity	1.89	1.84	1.60
Masticated six minutes in Banbury with jacket at 307° F.—rotors at 212° F.			
	Plasticity Tests—after Mastication		
Williams 3-min. "Y" at 212° F.-mils	108	95	(not
1-Min. recovery at 212° F.-mils	37	30	masticated)
	Character of GR-S—after Mastication		
Gel, %	1.7	0	..
Swelling index	265	..	..
Dilute sol. viscosity	1.68	1.61	..

In Table 1 more detailed results obtained on adding *Pepton 22* to a sample of GR-S latex (Type II) are shown. As in Figure 1, there is a slight plasticizing effect with 1.5% *Pepton 22* in the GR-S with the normal (at the time of this work) amount of antioxidant during drying. When the stabilizer or antioxidant is omitted, as in Compound 5, the 1.5% of *Pepton 22* causes a very marked softening during the drying. In fact this batch was so soft that it was not masticated. The plasticity tests after mastication of the other two batches show that the GR-S containing the *Pepton 22* is decidedly softer than the regular GR-S. It is interesting to note that the GR-S containing the *Pepton 22* shows no gel before or after mastication. This condition seems to be in line with the previously observed[5] tendency of this catalytic plasticizer to reduce gel formation when the GR-S is subjected to heat or hot mastication under the experimental conditions used.

The very marked softening obtained with 1.5% *Pepton 22* in the absence of an antioxidant during the drying, in comparison to the very slight softening effect obtained with the antioxidant present, appears to indicate that the antioxidant definitely retards the plasticization of GR-S. It does not appear practical, however, to omit the antioxidant in the presence of 1.5% of the plasticizer and particularly since the temperatures in the factory driers may reach 215° F. On the other hand it might be possible to reduce the antioxidant ratio and also use lower amounts of the catalytic plasticizer. Some typical results along this line are shown in Table 2.

TABLE 2. PEPTON 22 AND LOWER ANTIOXIDANT RATIOS ADDED TO GR-S LATEX BEFORE COAGULATION

(Salt-Acid Coagulation) Compound	6	7	8	9	10
GR-S Latex (Type II-27.7% solids), gms.	905	905	905	905	905
50% phenyl-Beta-naphthylamine disp	7.5	3.75	3.75	0	0
50% Pepton 22 disp.	0	7.5	5.0	5.0	2.5
Coagulated, washed, and then dried three hours at 190° F.					
PBNA parts/100 of polmyer	1.5	0.75	0.75	0	0
Pepton 22 parts/100 of polymer	0	1.5	0.1	1.0	0.5
Wt. of polymer equiv. to 100 GR-S	100	100.75	100.25	99.5	99
	Plasticity Tests—after Drying				
Williams 3-min. "Y" at 212° F.-Mils.	119	114	114	105	97
1-Min. recovery at 212° F.-mils	34	32	31	37	33
	Character of GR-S—after drying				
Gel, %	0	0	0	24.4	15.1
Swelling index	...	...	...	60.0	120
Dilute sol. viscosity	1.86	1.80	1.82	1.17	1.17
Masticated six minutes in Banbury with jacket at 307° F. rotors at 212° F.					
	Plasticity tests—after Mastication				
Williams 3-min. "Y" at 212° F.-mils.	122	71	86	115	115
1-Min. recovery at 212° F.-mils	50	14	26	43	48
	Character of GR-S—after Mastication				
Gel, %	15.4	0	0	35.2	32.5
Swelling index	155	...	...	40.	45.
Dilute sol. viscosity	1.30	1.32	1.44	0.76	0.69

TABLE 3. PEPTON 22 in GR-S ADDED TO LATEX BEFORE COAGULATION

Compound	Min.	6	7	8	9	10
Banbury masticated GR-S (See Table 2)		100	100.75	100.25	99.5	99
EPC black		50	50	50	50	50
Zinc oxide		5	5	5	5	5
Sulfur		2	2	2	2	2
MBTS		0.5	0.5	0.5	0.5	0.5
DOTG		0.7	0.7	0.7	0.7	0.7
Unsaturated petroleum hydrocarbon		5	5	5	5	5
Added phenyl-Beta-naphthylamine.		0	0.75	0.75	1.5	1.5
		Plasticity Tests after Mixing and Remilling				
Williams 3-min. "Y" at 212° F.-mils		131	105	112	140	133
		Plasticity Tests after 2.5 Hours in Boiling Water				
Williams 3-min. "Y" at 212° F. mils		180	165	165	287	277
Change, %		+37.4	+57	+47.3	+105	+108
Cure at 286° F.-Min.		Shore Hardness (0.5-30-Inch Dwell)				
30		58-52	57-51	56-50	63-54	61-52
60		61-55	62-55	60-54	66-54	65-56
90		63-56	62-55	60-54	67-56	67-58
	Min.	Shore Hardness (30-Inch Dwell) Cut-Growth Strips				
Unaged	60	56	56	56	59	59
Aged 24 hours at 212° F.	60	62	63	62	69	68
	Min.	Cut Growth Rate (Mils 1000 Flexes—135° Bend				
Unaged	60	22	22	22	109	125
Aged 24 hours at 212° F.	60	49	43	39	235	240
		% Rebound (Bashore)				
Unaged	60	38	35	37	28	30

From the results of Table 2 it is evident that (see Compounds 9 and 10) with low amounts (0.5 to 1.0%) of *Pepton 22* and no antioxidant there is a decided amount of gel formed during drying and also during hot mastication. This gel is usually objectionable from the standpoint of cut-growth and some of the other physical properties of some compositions such as, for example, tire treads. On the other hand this high amount of gel may contribute[7] to improved processing where less shrinkage and smoother stock is desired in certain calendering or extruding operations where the above-noted quality defects can be tolerated.

The batches containing antioxidant or a combination of antioxidant and plasticizer show no gel after drying.

[7] "Gel as a Definitive Property in GR-S Technology." L. M. White, E. S. Ebers, G. E. Shriver, S. Breck, *Ind. Eng. Chem.*, 37, 8, 770 (1945).

TABLE 4. PEPTON 22 IN GR-S—TENSILE TESTS BEFORE AND AFTER 48 HOURS' AGING AT 212° F.

Unaged	30 Min. at 286° F.					60 Min. at 286° F.					90 Min. at 286° F.				
Compound	Mod.* at 200%	Mod.* at 300%	Ten.	Elong. %	Set† %	Mod. at 200%	Mod. at 300%	Ten.	Elong. %	Set %	Mod. at 200%	Mod. at 300%	Ten.	Elong. %	Set %
6 Control	450	850	2625	605	25	600	1250	3000	520	18	650	1375	2950	490	15
7 0.75% PBN in latex 1.5% Pepton 22	425	850	2350	615	32	600	1150	2650	540	26	600	1200	2725	520	20
8 0.75% PBN in latex 1.0% Pepton 22	500	875	2200	540	23	575	1150	2750	530	22	600	1250	2600	480	17
9 No PBN in latex 1.0% Pepton 22	400	725	1375	460	23	600	1125	1700	395	17	650	1300	1850	380	15
10 No PBN in latex 0.5% Pepton 22	500	900	1625	445	21	675	1250	1800	390	16	750	1425	1900	370	13
Aged															
6	1300	..	2625	325	..	1225	..	2550	330	..	1150	..	2575	340	..
7	1325	..	2350	300	..	1250	..	2500	340	..	1100	..	2550	355	..
8	1350	..	2425	285	..	1175	..	2650	345	..	1150	..	2700	360	..
9	1600	..	2200	255	..	1575	..	2150	245	..	1450	..	2000	250	..
10	1725	..	1975	220	..	1600	..	2200	245	..	1525	..	2200	250	..

*Modulus and tensile in p.s.i.
†Set at break two minutes after break.

TABLE 5. PEPTON 22 IN HIGH VISCOSITY GR-S (MADE AT 41° F.)

Salt-Acid Coagulation Batch=250 Grams

Compound	11	12	13	14	15	16
GR-S from latex	100	100	100	100	100	100
Pepton 22 (from 60% disp. in H_2O)	0	0.75	1.25			
	Added in latex					
Pepton 22 (dry)				0	0.75	1.25
				Added in Banbury		
	Mooney Viscosity (ML-4 at 212° F.)					
Before mastication	85	83	80	87	87	87
After mastication*	76	50	38	70	50	42
	Character of GR-S after Mastication					
Gel, %	0	8.3	0.86	†0	7.1	0.27
Swelling index	..	270	540	..	310	890
	Compounding Notes					
Softener	"Bardol" in each compound					
Accelerator MBTS	1.5 in each compound					
Accelerator DPG	0.2 in each compound					
Cure at 292° F.-50 min.	Cut Growth Rate (Mils/1000 flexes-135° Bend)					
Before aging	7.3	8.0	8.4	7.4	10.0	10.2
After 24 hours at 212° F.	27	29	29	21	30	28
Before aging	Tensile Tests—50 Minute Cure at 292° F.					
Mod. at 300%‡	1250	1400	1375	1150	1375	1425
Tensile‡	4550	4175	3675	4575	4000	3900
Elong., %	635	590	555	655	580	560
After 48-hrs. aging at 212° F.						
Mod. at 300%	2775	3175	3125	2625	2925	3025
Tensile	3575	3650	3650	3600	3550	3525
Elong., %	355	355	340	370	355	340

*Six minutes in Banbury with jacket at 298° F. and rotors at 212° F.
†Compound 14 before mastication had 1.2% gel with S. I. of 300.
‡Modulus and tensile in p.s.i.

However only those (Compounds 7 and 8) containing 0.75% antioxidant and 1.0 to 1.5% Pepton 22 show no gel after hot mastication. These batches (Compounds 7 and 8) show only a slight amount of softening during drying, but show a good increase in plasticity on hot mastication.

The batches of Table 2 were compounded, as shown in Table 3, using the same amount of *GR-S polymer hydrocarbon* in each compound. The total antioxidant content of all compounds was made the same (1.5% of GR-S) by adding the required additional antioxidant during compounding.

The data in Tables 3 and 4 indicate that the very soft GR-S in Compounds 7 and 8 gives almost the same physical properties as obtained with the control GR-S in Compound 6. The tensiles are a little lower before aging, but after aging they are fully equal to those obtained with the control. The cut-growth rates of Compounds 7 and 8, containing Pepton 22, before aging are the same as that of the control. After aging, however, these compounds show somewhat lower (better) cut-growth rates than the control with the regular GR-S.

Compounds 9 and 10 show the effects of the gel in the GR-S and are decidedly inferior to the other compounds.

GR-S-X-435 Type (Made at 41° F.)

Early in 1948, when samples of the low temperature GR-S and its latex became available, Pepton 22 was found to be an effective plasticizer for this new GR-S with midget Banbury (hot) mastication.

Figure 3 shows some results obtained on adding Pepton 22 to an early sample of the new GR-S latex containing a high viscosity polymer. In addition it also shows a comparison of adding the Pepton 22 to the latex prior to coagulation and of adding the Pepton 22 to the dry polymer (from the same lot of latex) in the Banbury. On comparing the Mooney values before and after mastication it is evident that Pepton 22 is a very effective plasticizer for the new GR-S. It is also apparent that essentially the same results are obtained when the Pepton 22 is added to the latex prior to coagulation as obtained with the Pepton 22 added as a dry powder to the polymer in the Banbury.

The action of Pepton 22 in the high viscosity GR-S made at 41° F. is shown in more detail in Table 5. The antioxidant (1.25% phenyl-β-naphthylamine) was added to the latex before coagulation and is included in the 100 parts of GR-S from the latex indicated in the table, as well as in the other tables showing work on the low temperature GR-S which follow.

The low temperature GR-S was compounded according to the following base formula:

Polymer (including antioxidant)	100
E. P. C. black	50
Softener as noted in tables	5
Zinc oxide	5
Sulfur	2
Stearic acid	1.5
Accelerator as noted in tables.	

The data on the character of the GR-S after mastication in Table 5 indicates that 0.75% Pepton 22 causes some gel formation under the conditions used for mastication; while 1.25% Pepton 22 gives only a trace of gel.

The higher cut-growth rates and the higher modulus figures for the stocks containing Pepton 22, particularly in the cases (Compounds 13 and 16) where there is only a trace of gel, indicate that this GR-S plasticized by Pepton 22 may require less accelerator than the controls (Compounds 11 and 14).

The tensiles of the unaged compounds containing Pepton 22 are somewhat lower than those of the controls, but after aging there appears to be very little difference in the tensile values.

Tables 6 and 7 show some results obtained on using 1.25% Pepton 22 with the same mastication as in Table 5 followed by compounding with 20 and 25% reduction in total accelerator concentration. The results in Tables 6 and 7 are the averages of data obtained on two separate runs of each compound from the latex to the final compound.

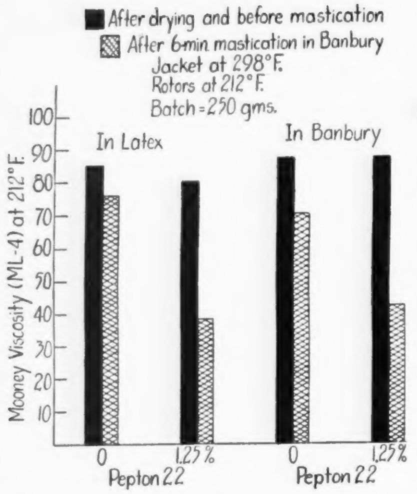


Fig. 3. Pepton 22 in High Viscosity GR-S (Made at 41° F.) from Same Sample of Latex (Salt-Acid Coagulation)

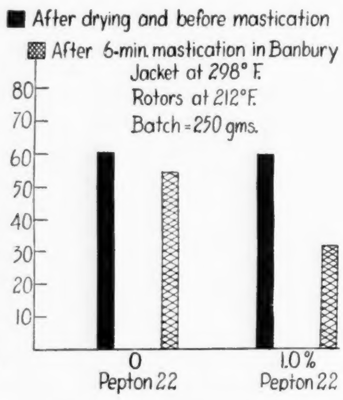


Fig. 4. Pepton 22 in GR-S (X-435 Type) Added to Latex Before Coagulation (Salt-Acid)

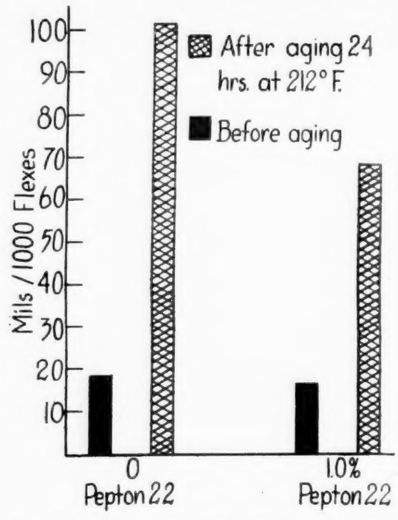


Fig. 5. Pepton 22 in GR-S-X-435—Added to Latex Before Coagulation (Salt-Acid)—Cut-Growth Rates with 180° Bend on EPC Black Compounds Cured to Same Modulus—Cure = 50 Minutes at 292° F.

TABLE 6. PEPTON 22 IN HIGH VISCOSITY GR-S (MADE AT 41° F.)
Salt-Acid Coagulation Batch=250 grams

Compound	17	18	19
GR-S from latex	100	100	100
Pepton 22 (from 60% disp. in H_2O)	0	1.25	1.25
	Mooney Viscosity (ML-4 at 212° F.)		
Before mastication	87.5	82.5	85
After hot Banbury mastication	78	43	42.5
Compounded	75	59	60
	Compounding Notes		
Softener	"Bardol"	"Bardol"	"Bardol"
Accelerator MBTS	1.5	1.20	1.125
Accelerator DPG	0.2	0.16	0.15
Reduction	..	20%	25%
Cure at 292° F.50.-min.	Cut-Growth Rate (Mils/1000 flexes - 135° Bend)		
Before aging	7.0	7.1	7.2
After 24 hrs. at 212° F.	28	20	21
Cure at 292° F. -min.	Rex Hardness		
25	66	65	65
50	70	70	69
90	71	70	70
Cure at 292° F.-60	Heat Build-up		
Goodrich flexometer △T °F.	105	108	111

stocks containing Pepton 22 show better cut-growth resistance after aging than the control.

The unaged tensiles of the compounds containing Pepton 22 for the 50- and 90-minute cures are on the average only 8% to 12% lower than those obtained with the unplasticized polymer. After aging, the tensiles of the compounds containing Pepton 22 are, on the average, only slightly lower than those of the control compound.

Figure 4 shows some typical results obtained on adding Pepton 22 to a sample of the GR-S latex made at 41° F. containing a normal viscosity polymer (X-435 type). Here there is practically no softening during drying but with hot mastication the GR-S (X-435 type) containing the Pepton 22 shows a much greater reduction in viscosity than the same polymer with no plasticizer.

TABLE 7. PEPTON 22 IN HIGH VISCOSITY GR-S (MADE AT 41° F.)—TENSILE TESTS BEFORE AND AFTER 48 HOURS' AGING AT 212° F.

	25 Min. at 292° F.				50 Min. at 292° F.				90 Min. at 292° F.			
Unaged	Mod.* at 300%	Ten.*	Elong. %	Set† %	Mod. at 300%	Ten.	Elong. %	Set %	Mod. at 300%	Ten.	Elong. %	Set %
17 Control	590	3640	805	24	1175	4215	625	16	1540	4100	535	11
18 1.25% Pepton 22 20% lower accelerator	450	2290	785	31	1150	3565	590	18	1500	3775	530	14
19 1.25% Pepton 22 25% lower accelerator	425	2265	805	33	1135	3725	630	21	1500	3975	560	15
Aged 17	2440	3565	390	..	2740	3465	350	..	2750	3550	355	..
18	2365	3500	405	..	2790	3175	330	..	2615	3675	390	..
19	2250	3315	390	..	2875	3190	330	..	2675	3125	335	..

*Modulus and tensile in p.s.i.
†Set at break two minutes after break.

The Mooney viscosity figures in Table 6 again show that 1.25% Pepton 22 gives a good reduction in the viscosity of this low temperature GR-S with hot midget Banbury mastication. Part of the reduction in viscosity carries through to the compounded GR-S, which fact might indicate better processing stocks.

The cut-growth figures for the unaged stocks in Table 6 and the modulus figures for the unaged stocks at full cure (50 minutes at 292° F.) in Table 7 indicate that with "Bardol" the new GR-S plasticized with Pepton 22 requires approximately 20% less accelerator than when no Pepton 22 is used. It is interesting to note that when this GR-S is plasticized by Pepton 22 with hot mastication and cured to the same modulus as the control, the

Some more typical results obtained on adding Pepton 22 to GR-S X-435 type of latex before coagulation (salt-acid) are shown in Tables 8 and 9. These results are the averages of data obtained on two separate runs of each compound.

From the Mooney viscosity figures in Table 8 it is again evident that Pepton 22 is an effective plasticizer, during hot mastication under the conditions used, for this GR-S made at 41° F. Also a good part of the reduction in viscosity carries through to the mixed compound, thereby indicating an improvement in processing qualities.

The physical data on the cured compounds in Table 8, as well as the modulus figures for the 50-minute cure in Table 9, indicate that the GR-S-X-435 plasticized with 1.0% of Pepton 22 and compounded with a 15% lower

accelerator concentration gives about the same cure as obtained with the control (Compound *20*).

The tensile values of the GR-S-X-435 containing Pepton *22* and the 15% lower accelerator ratio are about the same as those of the GR-S-X-435 control both before and after aging.

The cut-growth rates of the unaged compounds containing the Pepton *22* are about the same as that of the control containing no plasticizer. After aging, the compounds (*21* and *22*) containing the GR-S-X-435 plasticized with Pepton *22* show much lower cut-growth rates (better) than the control (Compound *20*). This is a definite indication of quality improvement. Figure 5 shows a comparison of the cut-growth rates of Compounds *20* and *21*.

Table 8. Pepton 22 in GR-S-X-435

Banbury Jacket at 298° F—Rotors at 212° F.—Batch-270 Grams

Compound		20	21	22
GR-S-X 435 from latex		100	100	100
Pepton 22 (from 50% disp. in H_2O)		0	1.0	1.0
		Mooney Viscosity (ML-4 at 212° F.)		
Before mastication		57	55.5	57.5
After 6-min. mastication		53	38	41
Compounded		72	62.5	62.5
		Polymer Temperature on Dumping from Banbury		
(After mastication), °F.		315	315	315
		Character of GR-S-X-435		
Before mastication—gel, %		2.1	4.8	4.3
After mastication—gel, %		0	0	0
		Compounding Notes		
Softener		"BRT #7"	"BRT #7"	"BRT #7"
Accelerator	MBTS	1.5	1.275	1.20
	DPG	0.2	0.17	0.16
Reduction		..	15%	20%
Cure at 292° F.—50 min.		Cut-Growth Rate (Mils 1000 Flexes—180° Bend)		
Before aging		18	16	16
After 24 hrs. at 212° F		101	68	69
Cure at 292° F.	-Min.	Rex Hardness		
	25	65	65	65
	50	70	70	70
	90	71	72	71
Cure at 292° F.	-Min.	% Rebound (Bashore)		
Unaged	50	38	36	37

Table 10. Pepton 22 in GR-S-X-485

Banbury Jacket at 298° F.—Rotors at 212° F.—Batch-270 Grams

Compound		23	24	25
GR-S-X-485 (from latex)		100	100	100
Pepton 22 (from 50% disp. in H_2O)		0	0.5	1.0
		Mooney Viscosity (ML-4 at 212° F.)		
Before mastication		61	60	60
After 6-min. mastication		46.5	44.5	33
Compounded		65.5	60	53
		Polymer Temperature on Dumping from Banbury		
(After mastication), °F		333	333	328
		Character of GR-S-X-485		
Before mastication—gel, %		0	0	0
Dilute sol. (intrinsic) viscosity		1.95	1.94	1.93
After mastication—gel, %		0	<2	0
Dilute sol. (intrinsic) viscosity		1.71	1.79	1.54
		Compounding Notes		
Softener		"BRT #7"	"BRT #7"	"BRT #7"
Carbon black		HAF	HAF	HAF
Accelerator	MBTS	0.90	0.80	0.80
	DPG	0.12	0.10	0.10
Reduction		..	11.8%	11.8%
Cure at 292° F.—50 min.		Cut-Growth Rate (Mils/1000 Flexes—180° Bend)		
Unaged		10	13	12
After 24 hrs. at 212° F		42	41	32
Cure at 292° F.	Min.	Rex Hardness		
	25	69	68	69
	50	71	70	71
	90	73	71	71
Cure at 292° F.	50 Min.	% Rebound (Bashore)		
Unaged		39	39	37
Cure at 292° F.—60 min.		Heat Build-up		
Goodrich flexometer ΔT °F		118	124	119

The Mooney viscosity figures in Table 10 show that 1.0% of Pepton *22* gives a good reduction in viscosity or plasticizing effect with six-minute mastication with the Banbury jacket at 298° F. and the rotors at 212° F. A good part of this reduction in viscosity carries through to the mixed compound and gives a softer stock than when no plasticizer is used, thereby indicating improved processing qualities. The 0.5% ratio of Pepton *22* gives very little plasticizing effect under the conditions used.

The physical data in Tables 10 and 11 indicate that with 1.0% of Pepton *22* a 11.8% reduction in accelerator concentration gives about the same cure as obtained with the control. It appears that when the GR-S-X-485 plasticized with Pepton *22* and compounded with HAF black (Philblack O) is cured to approximately the same modulus as the control, the unaged cut-growth rate is slightly higher than that of the control. After aging, however, the cut-growth rate of the GR-S-X-485 containing Pepton *22* is considerably lower (better) than that of the control.

The tensile tests in Table 11 show that the plasticized GR-S-X-485 gives essentially the same tensiles before and after aging as obtained with the control. The physical properties after aging indicate that Pepton *22* has no detrimental effects on the aging qualities of the GR-S-X-485.

Table 9. Pepton 22 in GR-S-X-435—Tensile Tests before and after 48 Hours' Aging at 212° F.

Compound	25 Minutes at 292° F. Mod.* at 200%	Mod.* at 300%	Ten.	Elong. %	50 Minutes at 292° F. Mod. at 200%	Mod. at 300%	Ten.	Elong. %	90 Minutes at 292° F. Mod. at 200%	Mod. at 300%	Ten.	Elong. %
Unaged												
20-Contro	175	415	3225	845	450	990	3665	650	640	1265	3550	575
21- 1% Pepton 22 15% lower accelerator	150	325	2550	905	450	1000	3550	660	600	1250	3465	565
22- 1% Pepton 22 20% lower accelerator	150	315	2540	915	390	950	3490	655	565	1225	3475	575
Aged												
20	940	1775	2650	410	1165	2090	2875	395	1150	2150	2790	380
21	850	1690	2925	470	1215	2175	2975	395	1125	2140	2615	345
22	875	1700	2925	475	1250	2175	2800	375	1215	2125	2840	385

*Modulus and tensile in p.s.i.

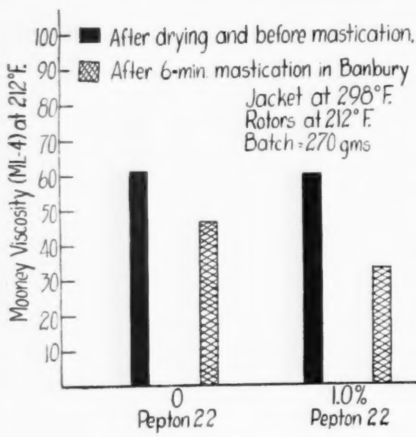
GR-S-X-485 (Made at 41° F.)

Figure 6 shows some typical results obtained on adding Pepton *22* to the GR-S-X-485 latex before the usual salt-acid coagulation. In this case there is little or no softening during the drying, but on hot mastication the GR-S-X-485 containing 1.0% Pepton *22* shows a much greater reduction in viscosity than the GR-S-X-485 without the plasticizer. The results obtained with GR-S-X-485 are shown in more detail in Tables 10 and 11. These results are the averages of data obtained on two separate runs of each compound from the latex to the finai compound.

In compounding the GR-S-X-485, HAF black was used in place of the EPC black.

Fig. 7 (*Right*). Pepton 22 in Natural Rubber from Same Sample of Latex

Fig. 6 (*Below*). Pepton 22 in GR-S X-485—Added to Latex Before Coagulation (Salt-Acid)



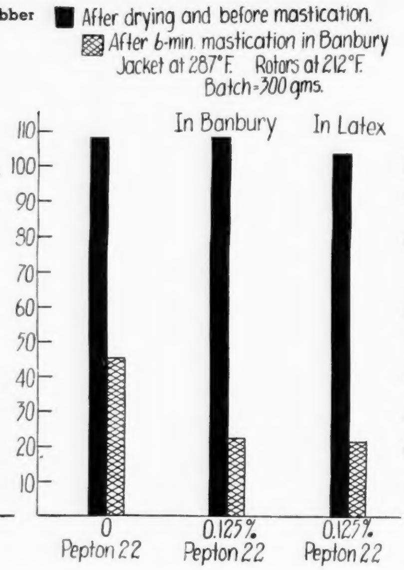


Fig. 9. Pepton 22 in Smoked Sheets Prepared at the Plantation—Concentration of Pepton 22 = 0.125% on S. S.

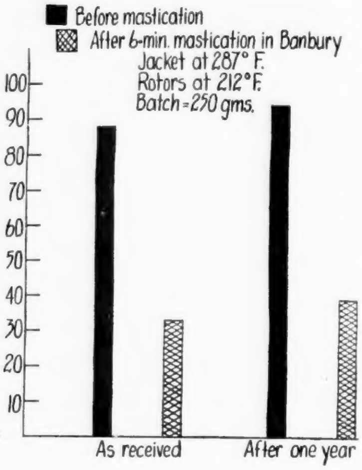


Table 11. Pepton 22 in GR-S-X-485—Tensile Tests before and after 48 Hours' Aging at 212° F.

Compound	25 Minutes at 292° F. Mod.* at 200%	Mod.* at 300%	Ten.*	Elong. %	50 Minutes at 292° F. Mod. at 200%	Mod. at 300%	Ten.	Elong. %	90 Minutes at 292° F. Mod. at 200%	Mod. at 300%	Ten.	Elong. %
Unaged												
23- Control	550	1265	3300	600	940	1950	3725	490	990	2075	3690	460
24- 0.5% Pepton 22 11.8% lower accelerator	475	1150	2925	590	840	1765	3525	495	965	2050	3625	445
25- 1.0% Pepton 22 11.8% lower accelerator	600	1275	3140	595	890	1840	3540	495	965	1975	3550	460
Aged												
23	1640	2900	3340	340	1740	3050	3240	310	1465	2765	3490	370
24	1640	2975	3290	320	1675	3025	3365	325	1465	2800	3300	345
25	1750	3125	3375	325	1725	3065	3500	335	1475	2765	3490	365

*Modulus and tensile in p.s.i.

Table 12. Pepton 22 in Natural Rubber

Compound	26	27	28
Natural rubber (from latex)	100	100	100
Pepton 22 (from 36% disp. in H_2O)	0		0.090
Pepton 22 (dry)		0.090 Added to dry rubber in Banbury	Added to latex before coagulation
Plasticity Tests Before Hot Banbury Mastication			
Williams 3-min. "Y" at 212° F.—mils	298	298	298
After Hot Banbury Mastication*			
Williams 3-min. "Y" at 212° F.—Mils	146	96	95
1-Min. recovery at 212° F.—mils	47	11	12

*250 grams masticated six minutes in the Banbury with the jacket at 287° F. and the rotors at 212° F. (shows a rubber temperature of 295° F. at the end of mastication period).

Natural Rubber

It has been shown[5] that Pepton 22 in concentrations ranging from about 0.05 to 0.5% is a very effective plasticizer for dry natural rubber during hot mastication.

Table 12 shows some typical results obtained on adding Pepton 22 to a sample of natural rubber latex before coagulation. The data show that as little as 0.09% Pepton 22 on the rubber survives the coagulation, washing, and drying operations and gives a good plasticizing effect when the dry rubber is hot masticated. In this case there was no softening during drying, and the same plasticizing effect was obtained during hot mastication as obtained when the same amount (0.09%) of dry Pepton 22 was added to the dry rubber (from the same lot of latex) in the Banbury.

Somewhat similar results are shown in Figure 7 with 0.125% of Pepton 22 on the rubber. Here there was a very slight softening during the drying of the rubber containing the Pepton 22 added to the latex before coagulation. Again it is evident that essentially the same plasticizing effect is obtained with the rubber prepared with the Pepton 22 on hot mastication as when the dry Pepton 22 is added to the rubber (from the same latex) in the Banbury.

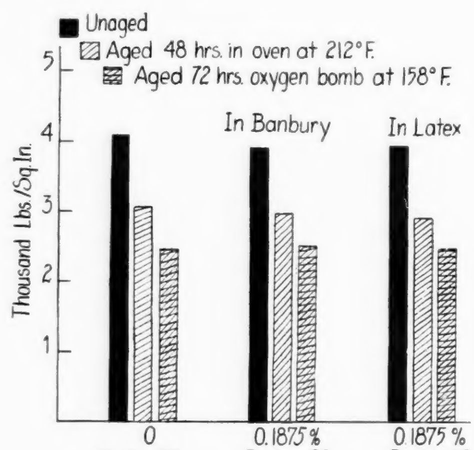


Fig. 8. Pepton 22 in Smoked Sheets—Tire Tread Compound—Tensile Strength-Average of 30- and 45-Minute Cures at 286° F.

Table 13 shows some results obtained on using various dispersions or slurries of Pepton 22 for the addition to the latex before coagulation. The data indicate that prac-

tically the same results were obtained with the various methods of adding the Pepton 22. In other words, it appears that it is not necessary to use a dispersion prepared by the ball mill method. The 15% slurry shows more rapid settling than the more concentrated dispersions or slurries and does not appear to be so convenient to handle as the others. However all such dispersions of solids for addition to latex usually require thorough stirring before weighing for addition to the latex.

TABLE 13. PEPTON 22 IN NATURAL RUBBER

Banbury Jacket at 287° F.—Rotors at 212° F.—Batch-300 Grams

Compound	29	30	31	32	33	34
Natural rubber (from latex)	100	100	100	100	100	100
Pepton 22 (from 60% disp.* in H_2O)			0.125			
Pepton 22 (from 60% slurry† in H_2O)				0.125		
Pepton 22 (from 15% slurry‡ in H_2O)					0.125	
Pepton 22 (from 60% slurry§ in H_2O)						0.125
			Added by latex before coagulation			
Pepton 22 (dry)		0.125 Added in Banbury				
			Mooney Viscosity before Hot Mastication			
ML-4 at 212° F.	108	108	102	103	106	103
			Mooney Viscosity after Hot Mastication			
ML-4 at 212° F.	45	22	22	22	20	21

*60% disp. prepared by ball milling.
†60% slurry prepared by hand grinding in a mortar.
‡15% slurry prepared by hand grinding in a mortar.
§60% slurry prepared by hand grinding in a mortar. Pepton 22 blended with 4% of Daxad #11 and micropulverized so that 98.5% passed a 200-mesh screen.

A sample of smoked sheets prepared in the Far East with 0.1875% of Pepton 22 was compared to some regular 1-X smoked sheets, as shown in Tables 14 and 15. After mastication the rubber was compounded according to the following base formula:

Smoked sheets	100
EPC black	50
Zinc oxide	5
Sulfur	3
Stearic acid	3
Pine tar	2
Phenyl-B-napthylamine	1
B-L-E (Liq.)	1
MBT	1.25

TABLE 14. PEPTON 22 IN SMOKED SHEETS

Banbury Jacket at 287° F.—Rotors at 212° F.—Batch—280 Grams

	35	36	37
1-X smoked sheets	100	100	
Sample smoked sheets containing Pepton 22			100.1875
Pepton 22		0.1875 Added in Banbury	
		Mooney Viscosity (ML-4 at 212° F.)	
Before mastication	92	92	98
After 6-min. mastication	72	36.5	38
		Compounded Mooney Scorch at 250° F.	
(MS) Time—min	22	23	22
		Compounded Viscosity at 250° F	
MS-4	27	23	23

The Mooney viscosity figures in Table 14 show that the smoked sheets prepared with 0.1875% of Pepton 22 is readily plasticized when subjected to hot mastication. Although the rubber hydrocarbon may not be from the same source, the decrease in viscosity with mastication is practically the same as that obtained when the same amount of Pepton 22 is added to standard 1-X smoked sheets in the Banbury. Also, it appears that the rubber plasticized with Pepton 22 gives a softer mixed compound than when no plasticizer is used. Pepton 22 does not increase the scorching tendency of the rubber.

The tensile tests at full cure (Table 15) show that the plasticized rubber gives practically the same physical properties as obtained with the control. The tensiles for the 30- and 45-minute cures at 286° F. before and after aging in both the oven and oxygen bomb are shown in Figure 8. From these as well as the physical properties in Table 15 it is evident that Pepton 22 has no adverse effects on the aging qualities of the rubber. These data indicate that good smoked sheets with improved plasticizing qualities may be prepared by adding the Pepton 22 to the latex prior to coagulation.

Figure 9 shows some Mooney viscosity values obtained on a sample of smoked sheets prepared with 0.125% Pepton 22 as received from the plantation and after one-year storage at room temperature. It is apparent that there was no softening during the storage period, but on the other hand, there is evidence of the usual hardening[8] of the rubber on storage. When subjected to hot mastication, however, the one-year-old rubber gives the same decrease in viscosity as obtained when first received. The data definitely indicate that natural rubber may be prepared at the plantation with the desired amount of Pepton 22, shipped, and stored without softening until it is subjected to hot mastication.

Summary

The results of some experiments in adding the previously described o,o'-dibenzamidodiphenyldisulfide or 2,2'-dithiobisbenzanilide, now known as Pepton 22, to GR-S latex and to natural rubber latex prior to coagulation are presented. This catalytic plasticizer may be dispersed in water and added to GR-S latex (made at 122° F. or 41° F.) and to natural rubber latex before coagulation and thereby obtain washed and dried polymers which can be readily plasticized by hot mastication.

Since most of the factory-size masticating equipment gives only hot mastication, particularly with the new types of GR-S, as well as with most types of natural rubber, only comparisons of hot mastication of the polymers with and without Pepton 22 are shown.

(*Continued on page* 513)

[8] "Cause of Variability in the Plasticity of Plantation Rubber after Storage," G. Martin and L. E. Elliott, *Rubber Chem. Tech.*, V, 219 (1932).

TABLE 15. PEPTON 22 IN SMOKED SHEETS—TENSILE TESTS BEFORE AND AFTER AGING

	15 Minutes at 286° F.				30 Minutes at 286° F.				45 Minutes at 286° F.				60 Minutes at 286° F.			
Before Aging	Mod.* at 200%	Mod. at 300%	Ten.*	Elong. %	Mod. at 200%	Mod. at 300%	Ten.	Elong. %	Mod. at 200%	Mod. at 300%	Ten.	Elong. %	Mod. at 200%	Mod. at 300%	Ten.	Elong. %
35-Control	500	925	3900	645	725	1325	4125	610	850	1500	4075	565	900	1575	4000	555
36-S. S. + Pepton 22 in Banbury	500	1025	3850	635	825	1425	3900	570	875	1575	3900	530	900	1600	3800	515
37-S. S. made with Pepton 22	425	925	3500	630	750	1375	3950	575	850	1525	3875	555	925	1675	3825	530
After 48 hours in Oven at 212° F.																
35	1000	1750	3525	500	1350	2250	3200	410	1450	2400	2900	350	1525	2500	2850	330
36	1100	1900	3325	470	1400	2275	3100	380	1500	2450	2825	340	1575	2500	2625	310
37	1050	1800	3450	500	1425	2275	2950	370	1550	2500	2850	340	1575	2475	2800	330
After 72 hours in Oxygen Bomb at 158° F. and 300 p.s.i. O_2 Pressure																
35	575	1100	2975	600	850	1400	2625	510	925	1500	2250	450	975	1550	2150	400
36	675	1225	2850	560	900	1500	2650	500	1000	1625	2325	410	1000	1600	2100	390
37	625	1125	2750	570	875	1475	2625	490	975	1575	2300	430	1025	1600	2075	380

*Modulus and tensile in p.s.i.

EDITORIALS

"What about a Fourth Round of Wage Increases?"

THE General Electric Co. distributed during June a booklet with the title, "What about a Fourth Round of Wage Increases?", the contents of which are based largely on manuscripts and notes prepared for discussions at Harvard University in December, 1948, at The National Industrial Conference Board in February, 1949, and on the Columbia network on May 14, 1949, by its vice president in charge of employe relations, L. R. Boulware. A wealth of important information and conclusions is included in this little booklet, first on an analysis of the three possible appeals for any fourth round of wage increases that organized labor will make or is making, and, second, on what should be done about the long expected and long deserved readjustment that is taking place in business conditions in this country at the present time.

Since the rubber industry is in the midst of the current readjustment of business conditions and, at the same time, is faced with demands from the United Rubber Workers, CIO, for a fourth round of wage increases, Mr. Boulware's conclusions should be of much interest to management in the industry and might also give pause to officers of the rubber union in their forthcoming negotiations.

On any appeal for a fourth round of wage increases based on the "cost of living index," Mr. Boulware points out that the index has fallen significantly since last fall and is expected to fall 12 or 15 more points before the end of the current year. Such a decline, it is calculated, would result in industrial workers on the average having benefited by better than 10%, or better than 15¢ an hour in real wages.

With regard to the "ability to pay" approach based on "big profits," some of us forget that we have a *profit and loss* system. Half of our business enterprises fail. There is a wide variation in the amount of profit made by various companies in an industry or a neighborhood. Not all industry has been making a profit, even in the good years. The second-quarter statements this year will be eloquent of what can happen even to previously good profit makers when a buyer's market sets in.

On any appeal based on a wage increase to bolster consumer purchasing power if business becomes bad, it is emphasized that this pump-priming type of wage increase, if accompanied by appropriate price increases, would result in the loss of customers or whole markets, and if wage increases were given without price increases, all but a few of the best managed companies would be likely to go broke.

The highlights of Mr. Boulware's answers to the question of what should be done about the present business situation in general and the fourth round of wage increases, in particular, are as follows:

"1. Makers and sellers of goods, employes and unions, and all citizens must seriously devote themselves to the study of job-connected economics and of good citizenship so that we may all know how we may soundly conduct ourselves with enlightened self-interest in the pursuit of our material needs and desires—and be proof against something-for-nothing quack remedies in the economic and political fields.

"2. Makers and sellers must make initial price concessions appropriately down from the peak—and then go to work to make more concessions properly possible.

"3. Makers and sellers must seek constantly to better the quality, the reliability, and the general attractiveness of the product and price.

"4. People who believe in America—both in the soundness of our economic system and the good sense of our citizens—must continue to show their confidence by expanding and improving facilities for the future. Our economy—as any other kind—needs capital goods business in dull times. Too many concerns build new facilities only at the top of a boom.

"5. Makers and sellers must advertise more effectively and sell harder—must fill reluctant buyers with confidence that what's eventually ahead for us all is good—must *persuade* more people to buy in these times.

"6. Union officials must realize they have a better mission, in the interests of their members, than to seek annually the misleading flat national wage increases that only raise costs and prices to the sole end in the past seller's market of diluting the value of money, and now, of reducing rather than increasing jobs or making them secure. It ought to be possible for good union leaders to admit, and act in accordance with, the economic facts of life and still be elected by a membership they help soundly to educate. Union officials need in this present situation, as never before, to give their members confidence in the sincerity and soundness of any deserving management's efforts toward healthy emergence from the present readjustment, confidence that it's to the interest of all to pitch in and exercise full interest, care, skill, and effort to enable their employers to offer customers such attractive values as to be an insurance of greatest possible job security under these conditions.

"7. Government must do its part also. It needs to tell citizens the truth about economic matters and to help in the understanding of sound measures to be taken. It needs to resist fooling itself and its citizens with manipulation of the printed money supply. It needs to resist creating a fictitious demand for goods through any unneeded military expenditure or unwarranted gifts abroad, or unwise market operations at home. It needs to display and explain, rather than conceal, the true source of taxes and other money the government spends. It needs especially not to use as whipping boys the very people who are most earnestly trying to improve our standard of living and provide jobs of ever higher earning power in real wages."

Nylon as a Bearing Material[1]

Russell B. Akin[2]

NYLON as a plastic molding material is finding a steadily increasing number of industrial applications, such as for gears and bearings. Despite a chemical resemblance, the plastic types of nylon are not fibrous like the textile forms. A dozen types of nylon are now in commercial production as plastic molding powders. For most mechanical purposes the nylon designated FM-10001 is used because it is the most rigid, has the highest softening temperature, and is also the least expensive. This type of nylon is molded by the injection process, and many custom molders are experienced in handling this material. Bearings may be molded to shape, or blocks may be molded for machining where the number of pieces is not great enough to warrant molds of special shapes.

Advantages of Nylon Bearings

The advantages or reasons for use of nylon bearings follow:

(a) Low coefficient of friction. The static coefficient of nylon against polished steel is less than 0.15. Data on the dynamic coefficient of friction indicate considerable variation with the conditions of test. Where the application is satisfactory for long life, the measured coefficients have ranged from 0.20 down to as low as 0.04.

(b) Ability to be used without lubrication. Nylon bearings require no lubricant for a light load at high speed or for a moderate load at low speed. This characteristic is of particular importance to the textile industry, long plagued by the problem of oil spots. Under more rigorous conditions lubrication is required, and frequently water is an adequate lubricant. Motor oils do not affect nylon at temperatures as high as 325° F., nor are oils aversely affected by nylon, as demonstrated by the SAE Underwood test.

(c) Tolerances are somewhat less critical than with metal bearings. Because of its resilience, nylon has the ability to deform elastically at points where stress is concentrated, thus distributing the load over a large area. The plastic recovers its original shape when the load is removed unless the load has been quite heavy. With heavy loading a nylon bearing surface tends to glaze as it is subjected to wear and thus develops a very smooth surface conforming to irregularities in the shaft. The small clearance normally specified for rigid metal bearings are not only unnecessary, but also inadvisable with nylon. Our general recommendations is that nylon bearings operate with a clearance of at least 0.003-inch.

(d) Abrasion resistance. The abrasion resistance of nylon is outstanding among homogeneous plastics. Nylon yields slightly at the surface, but shows very little wear. The load-carrying ability and temperature range of nylon are approximately those of Babbitt metal, with considerably better abrasion resistance. Nylon bearings tested in the presence of sand have outworn metal bearings because the particles of sand actually became embedded in the nylon: the craters formed were smoothed over, and the bearing surface remained essentially intact.

(e) Ability to be injection molded. The large-scale production of nylon bearings by injection molding permits economies in manufacture by eliminating the costly machining necessary in the manufacture of bearings from other materials. Nylon is a high melting material which melts rather sharply to yield a fluid mass. During the injection molding operation this material is forced into a cavity where it rapidly sets up into a solid form. The speed of cutting is such that a definite advantage is gained even over such rapid machine operations as are performed on the normal screw machine. Because of this fluidity at molding temperatures, nylon can be molded in sections as thin as 0.005- to 0.008-inch.

Nylon Bearing Tests

Tests of nylon bearings in the Almen and Timken machines were made by du Pont and gave promising results. More specific recommendations as to load, speed, and lubrication were required, and to determine limiting conditions for the use of nylon bearings du Pont recently undertook a project at Battelle Memorial Institute. This work has been under way for only a short time and is continuing, and the paper is therefore to be considered only as a preliminary report.

Data are being obtained on systems where nylon runs against nylon, against cold rolled steel, and against brass; each of these pairs is being studied when dry, when lubricated with distilled water (or water with neutral potassium dichromate to minimize corrosion), and when lubricated with either SAE 10 or 30 oil.

The equipment used in the Battelle studies consists of a Neely bearing tester and sleeve bearings driven by variable speed motors with predetermined loads on these bearings. These tests still continue, and the data given here should be considered as preliminary and possible, to be modified by succeeding work.

Neely bearing tests are operated at boundary film lubricating conditions. It was found that the sharp edges customary in steel specimens cut the nylon severely. These edges were therefore slightly relieved, and consistent wear data were then obtained.

With SAE 10 oil at 125° F. as the lubricant, nylon was run on cold rolled steel at 1,550 p.s.i. bearing pressure and at a speed of 156 ft./min. The coefficient of friction at the start was 0.103, but fell off

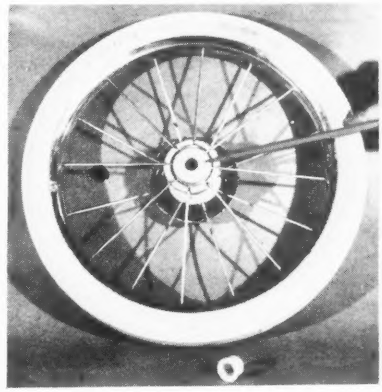


Fig. 1. Nylon Bearings for Baby Carriage Wheels Give Smooth, Silent Operation; This Is One of the First Commercial Applications of Nylon Bearings

to 0.080 at the end of 19-hour runs. Measurements of the coefficient of friction and the amount of wear were made at half-hour intervals. The wear of nylon was 0.0009-inch during the first half-hour; 0.0006-inch during the second half-hour; unmeasurably small during the next period; and averaged 0.0004-inch per half-hour over the 19-hour period.

With distilled water as the lubricant, the bearing load was reduced to 1,050 p.s.i. The coefficient of friction at the start of the water run was 0.556, and at the end of an hour was 0.676. Wear was greater than with oil lubrication despite the running of water tests at two-thirds of the oil test load. Both wear and friction in the case of water lubrication were excessive.

Examination of the water lubricating bath after the test was completed showed a milky appearance, and the presence of much nylon debris which might be responsible for the excessive wear. To determine whether this was the case, short tests were made comparing debris-laden water with a continuous stream of clean water. At 1,550 p.s.i. bearing load the debris-laden water gave a frictional coefficient of 0.304 and wear of 0.0434-inch per half hour; while clean water at 170 cc./min. flow gave a coefficient of 0.096 and wear of 0.00015-inch per half hour. A similar comparison was also obtained at 1,050 p.s.i. load.

From these Neely test data, the following tentative conclusions were drawn:

(1) Nylon to nylon contact is best in each of the lubricant conditions.

(2) Steel on nylon is nearly as good as nylon on nylon.

(3) A sixfold increase in speed over the original test speed of 156 ft./min. has no significant effect.

(4) The limiting loads with the different lubricants appear to be as follows: oil, 1,550 p.s.i.; water, 1,050 p.s.i.; and no lubricant, 550 p.s.i.

It should be noted that the load carrying capacity of the surface in the Neely

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[1] Presented before Rubber & Plastics Division, American Society of Mechanical Engineers, New York, N. Y., Nov. 30, 1948.

[2] Development engineer, plastics department, E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.

test may be high because these surfaces are in contact less than 10% of the time. This condition gives some opportunity for cooling, or for relaxation of strain. Swelling or deformation of test specimens is not a factor since the machine adjusts for this deviation. It is highly questionable whether the Neely test data can be extrapolated to sleeve bearing behavior.

Sleeve Bearing Tests

As can be expected, in actual sleeve bearings, where a metal journal is used, the heat is conducted away from the nylon bearing surface so that a metal-to-nylon bearing may be better than a nylon-to-nylon bearing.

Where lubrication was ample, nylon to brass showed poorer results than the other two pairs since the brass used showed some flaking of small brass particles. These particles embedded in the resilient nylon and scored the brass shaft. In most tests brass was about the same as steel, but in more severe tests results obtained with brass seemed confused by this flaking action. Results with brass are therefore not discussed here in detail.

Sleeve bearing tests were set up with electric motors whose speed could be varied from 180 to 2,500 r.p.m. The linear speed at bearing interface was 100 ft./min. at 300 r.p.m. The diametral clearance was set at 0.010-inch, and the bearing had a 1.25-inch inside diameter and 1.50-inch outside diameter. Weights were attached to the bearing housing to give predetermined unit loads, and the shaft smoothness was 8-15 micro-inches rms.

Under these conditions a steel shaft and nylon bearing showed no increase in friction during 500 hours' operation at bearing loads of eight and 10 p.s.i. A nylon shaft on nylon bearing lasted indefinitely and showed no friction buildup at eight p.s.i., but at 12 p.s.i. this assembly seized after 17 hours because of overheating. On all the sleeve bearing tests, within the range of speeds covered, speed had no effect on load capacity or wear.

To explore the effect of temperature another series of sleeve bearing tests was run. The lubricant used was SAE 30 oil; the diametral clearance was 0.010-inch; and the bearing had an inside diameter of 1.25-inch and outside diameter of 1.50-inch. An operating speed of 175 ft./min. and load of 40 p.s.i gave an equilibrium oil temperature of 160° F. No seizure was encountered in this test series after 50 hours.

When either the load or the speed was increased to bring the oil temperature up to 200° F., bearing seizure was encountered. This seizure was apparently due to thermal expansion of the nylon. Since the outside diameter of the nylon sleeve was confined, this expansion forced a reduction in the inside diameter of the sleeve and caused seizure. The nylon sleeve had been press-fitted into the steel housing with an interference fit of 0.0025-inch. These were results obtained with a brass shaft and showed some shredding of the brass, embedding of brass particles in the nylon, and resultant scoring of the journal.

By using a steel shaft instead of brass, it was possible to raise the load from 40 to 80 p.s.i. and increase the speed from 175 to 330 ft./min. before the oil temperature reached 160° F. At least 75 hours' operation was satisfactory under these conditions, but when the load was further increased to 120 p.s.i., failure occurred within 30 minutes, and the temperature rose to 200° F. The nylon sleeve seized on the shaft, and after cooling, the sleeve was no longer retained by the holder because of thermal contraction.

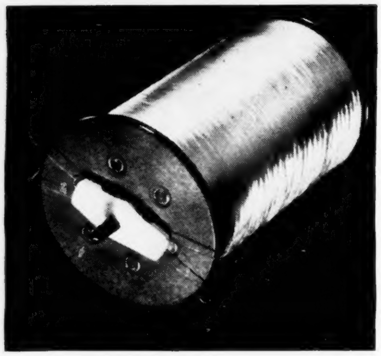

Fig. 2. Molded One-Piece Nylon Flyer Block Used in Textile Machinery Travels as Fast as 15,000 R.P.M. without Lubrication. Attached to Spindle in Spinning Operation, Block Holds Wires Providing Necessary Tension to the Yarn

A nylon shaft in nylon sleeve bearing assembly was operated at a speed of 100 ft./min. and load of 40 p.s.i., with oil temperature at 150° F. Wear was excessive in two hours and some melting of the nylon took place. The assembly was run for 30 additional hours without seizure, but the fit was sloppy, and both bearing surfaces were scored.

Summary and Conclusions

In general excessive loading, inadequate lubrication, or poor mounting of nylon bearings leads to the same sort of failure. The nylon heats up, expands, and may thereby seize the rotating shaft more tightly, thus accelerating the heating. Where local heating may bring the nylon to a temperature above 350° F., there will be a flow of nylon from the inside diameter of the sleeve bushing, giving an extruded fin at each end of the bearing.

At lower temperatures the strains normally existent in an injection molded piece may be released, permitting some warpage. This warpage may either increase or lessen the load; therefore the molding design becomes an important factor in setting recommended conditions for use of nylon bearings. This factor and others are the subject of continuing study.

SPI Conference on "New Markets for Plastics"

THE annual conference of the Society of the Plastics Industry, Inc., held on May 26 and 27 at the Edgewater Beach Hotel, Chicago, Ill., had as its theme, "New Markets for Plastics." Although limited in attendance to members, the conference recorded a registration of 458 to reach a new high, representing a total of 156 plastics companies. The meeting was held to be the best to date, and appreciation was expressed to the committee in charge headed by C. L. Cruver, Jr., Cruver Mfg. Co.

Thursday, May 26

The opening session, on the subject "The Challenge to Plastics," was presided over by C. A. Breskin, *Modern Plastics*, and consisted of three talks. Speaking on "Men Make Markets," P. W. Wachtel, Calvert Distillers Corp., emphasized that a company must determine why its products are not selling, and then change the approach or the product to give the public what it wants. S. M. Ballard, Gardner Advertising Agency, dealt with "Finding Your Markets," analyzing numerous approaches to the plastics marketing problem. Mr. Ballard stressed the need for first fully developing local markets before branching out; he also recommended the use of market surveys to determine actual needs. Treating of "How, When and Where to Sharpen Your Pencil," Allan Fritzsche, General Industries Co., outlined the growth of the plastics industry. Now that the postwar boom has ended, we must learn to sell our products and actually cut costs, rather than merely reduce profits or take orders at cost, Mr. Fritzsche stated.

The luncheon-session featured the presentation of the John Wesley Hyatt award to George T. Felbeck, Carbide & Carbon Chemicals Corp. The award, consisting of a gold medal and $1,000, is presented annually for outstanding achievement in the plastics industry during the preceding calendar year. Dr. Felbeck earned the honor by his outstanding work in the engineering developments leading to the large-scale manufacture of polyethylene resins and plastics. Dean R. F. Bach, Metropolitan Museum of Art, acted as toastmaster at the luncheon, and the award was presented by Gerald Wendt, *Science Illustrated*, the chairman of the award committee.

Afternoon group meetings were held by the injection molders and fabricators divisions. Edward Singer, Victory Mfg. Co., presided over the injection molders' meeting, which featured two papers: "Design for Plastics Sales," A. R. Olsen, Hercules Powder Co.; and "Controlled Flow, Balanced Gating, and Other Considerations in Polystyrene Molding," R. W. Van Sickle, G. B. Thayer, and E. L. Kropscott, Dow Chemical Co. Mr. Olsen outlined ways and means of increasing demands for cellulosic plastics and developing new volume markets for suitable applications. Raymond J. Olson, Federal Tool Corp., was elected chairman of the division for the coming year.

The fabricators' division meeting heard papers on "Importance of Adequate Sales Representation for Fabricators," by J. S. Kivett, Regal Plastics Co., and "New Designs in Signs with Acrylics," by F. W. Tetzlaff, Rohm & Haas Co. Mr. Kivett stressed the need of closer cooperation between fabricators and their customers; while Mr. Tetzlaff described the increasing acceptance of acrylic signs for outdoor displays. The meeting was presided over by M. L. Dinell, Clover Box & Mfg. Co., who stated that fabricators in the New York area are initiating a program designed to develop helpful informational services.

Friday, May 27

Morning group sessions were held by the compression molders, extruders, and film and sheeting divisions. Three papers were presented at the compression molders' meeting, presided over by J. J. Bachner, Chicago Molded Products Corp.: "High-Speed Angle-Type Transfer Molding Presses," J. W. Tomka, Elmes Engineering Works; "Low Pressure Molding Phenolics," E. F. Borro, Durez Plastics & Chemicals, Inc.; and "New Frontiers for Thermosetting Materials," W. T. Cruse,

SPI executive vice president, and C. W. Kleiderer, Glenn L. Martin Co.

Among the advantages of the high-speed angle-type molding press cited by Mr. Tomka was that it could be used for straight compression by means of a selector switch. The injection molding of thermosetting materials is entirely possible on the angle-type press, the speaker declared, but is still in the experimental stage. Mr. Borro noted that the changes stemming from low pressure molding phenolics are not only in the press equipment and prolonged mold finish, but also in the possibilities of opening up new mold-making techniques. Mr. Cruse discussed the results of a field survey made to study additional volume outlets for the thermosetting compression molding industry and also called on other investigators for specific possibilities in various industries. N. A. Backscheider, Recto Molded Products Corp., was named chairman of the division for the coming year.

C. N. Sprankle, Sandee Mfg. Co., presided over the extruders' division meeting, at which two papers were given: "Extrusion of Nylon," C. P. Fortner, E. I. du Pont de Nemours & Co., Inc.; and "Economics of Compounding and Extruding on a Single Machine," L. W. Street, Welding Engineers, Inc. Mr. Fortner described the different grades of nylon available for extrusion and discussed the processing techniques involved. Mr. Street dealt with the design and the operation of his company's new Compounder Extruder.

Three talks were offered at the morning session of the film and sheeting division, presided over by F. J. Groten, Firestone Plastics Co.: "Report on Film and Sheeting Activity," M. Goldman, Visking Corp.; "Importance of Product Evaluation," C. D. Segner, B. F. Goodrich Chemical Co.; and "The Importance of Specifications to the Resin Manufacturer, the Film and Sheet Manufacturer, and the Converter," F. W. Reinhart, National Bureau of Standards.

The luncheon session, with N. O. Broderson, Rochester Button Co., in the chair, featured the presentation of the informative labeling program developed by the SPI committee. Following the luncheon, Amos Ruddock, D. L. Gibb, and W. R. Dixon, Dow Chemical, gave a paper on "Put Your Supplier's Dollars to Work for You." This talk recommended that the industry develop an active and coordinated program of plastics merchandising, advertising, and quality improvement.

The election of new SPI officers took place during the business meeting which followed the luncheon. Horace Gooch, Jr., Worcester Moulded Plastics Co., was elected president, succeeding George H. Clark, Formica Co., who became chairman of the board of directors. Other officers elected were: vice president, J. J. B. Fulenwider, Hercules Powder; secretary, W. S. Perry, Franklin Plastics Division, Robinson Industries; and treasurer, J. E. Gould, Detroit Macoid Corp. Directors elected in addition to the new officers were: L. C. MacLeod, Monsanto (Canada), Ltd.; Mr. Cruver; H. G. Pratt, American Cyanamid Co.; A. C. Manovill, Ideal Plastics Corp.; E. B. Crawford, Auburn Button Works, Inc.; N. J. Rakas, National Automotive Fibres, Inc.; Mr. Dinell; Mr. Groten; E. R. Perry, Westinghouse Electric Corp.; F. W. McIntyre, Reed-Prentice Corp.; D. R. Siragusa, Molded Products Corp.; J. J. O'Connell, Consolidated Molded Products Corp.; A. W. Hanmer, Jr., Durez Plastics; S. E. Palmer, Tennessee Eastman Corp.; and F. N. Williams, Monsanto Chemical Co.

Afternoon meetings were held by the tool, die, and machinery division, the film and sheeting division, and the accounting and financial division. The tool, die and machinery meeting, presided over by Mr. McIntyre, featured three papers: "A New Concept in Large Thermoplastic Molding," by James Hendry, Jackson & Church Co.; "Hobbing Cavities in Alloy Steels," John Sekowski, Midland Die & Engraving Co.; and "Beryllium Copper Mold Components," John Press, Federal Tool Corp.

The afternoon meeting of the film and sheeting division heard papers on "Styling Trends and Potentials in the Vinyl Film Industry," by J. R. Price, Bakelite Corp.; "What the Retailer Expects from Vinyl Film Fabricators," by R. P. Magid, Hartford Textile Corp.; and "Trends in the Vinyl Industry," by D. S. Plumb, Monsanto. Mr. Price decried the tendency of some manufacturers to produce thinner films of lowered quality; he also stressed the need of continued quality improvement. Mr. Plumb, in outlining the growth of the vinyl film and sheeting industry, mentioned several new fields of possible application for these products.

Four papers were read at the accounting and financial division meeting, with E. H. Gabel, General Electric Co., presiding: "Incentive Pay for Supervisors," Monroe Smith, Plastic Manufacturers, Inc.; "The SPI Uniform Accounting Manual; Its Use as a Tool by Management for Optimum Results," Mr. Gabel: "Accounting Department Reports to Assure Prompt Managerial Correction of Unprofitable Operations," W. H. Nussbaum, Columbia Protektosite Co., Inc.; and "Recent Transportation Rate Trends," B. A. Butryman, Colt's Mfg. Co.

The conference concluded with a social hour and the annual banquet. Mr. Clark acted as toastmaster, and Judge H. C. Kessinger spoke on "What Road Are We On." The door prize, a television-radio-phonograph console, was won by G. W. Whitehead, Improved Paper Machinery Corp.

SPE Sections End Season's Sessions

THE New York Section, Society of Plastics Engineer's, Inc., held its last regular dinner-meeting before the summer recess, on June 14 at the Hotel Shelburne, New York, N. Y. Approximately 40 members and guests heard a talk on "S-Polymers" by Raymond G. Newberg, Standard Oil Development Co., who discussed the properties, compounding techniques, molding procedures, and applications of the S-Polymers. The talk was similar to his article, which was published in our May issue, but contained some elaboration of the discussion on injection and compression molding of these new materials.

In the business session preceding the talk, Section President Stanley Bindman, Noma Electric Corp., announced that beginning this fall the group will hold its dinner-meetings on the third Wednesday of each month. Reports were also heard from the treasurer and from the various committee chairmen. Table favors were distributed through the courtesy of Ideal Plastics Corp., and the meeting concluded with a drawing for a door prize, a melamine tableware set, contributed by American Cyanamid Co.

The Section's next meeting will be held on September 21 at the Hotel Shelburne. This meeting will be informal in nature, with no technical speaker, and will include a showing of the SPI film, "A Scientific Approach to Better Plastics." On October 19 the group will play host to the Newark Section and will hear a talk on "Injection Molding Design of Polystyrene," by Gordon B. Thayer, who is connected with Dow Chemical Co.

Western New England Section Holds Golf Tourney

The Western New England Section concluded its activities for the season with a golf outing on June 3. The program consisted of an afternoon golf tournament followed by a lobster dinner in the evening. Prizes were distributed to winning contestants, and drawings were held for door prizes contributed by member companies. The outing was voted to be highly successful, and it is planned to make the outing an annual affair.

Social Events at Philadelphia

Approximately 65 members and their wives attended the Ladies Night dinner-meeting of the Philadelphia Section, SPE, on May 25 at Gimbel Brothers auditorium and restaurant, Philadelphia, Pa. The meeting was held in conjunction with the Public Plastics Show in Gimbel's auditorium on May 23 to 28. Speaker of the evening was Armand N. Spitz, astronomer of the Franklin Institute, who demonstrated his portable planetarium and illustrated the skies as they would appear in various parts of the world in the different seasons. Plastics items contributed by local manufacturers were distributed to all attending, and the ladies were presented with methacrylate comb and brush purse-sets through the courtesy of Prolon Plastics Division, Pro-phy-lac-tic Brush Co.

The Philadelphia Section next held its annual golf outing on June 21 at the Du Pont Country Club, Wilmington, Del. Some 28 contestants participated in the afternoon golf tournament, which was followed by an evening cocktail hour and dinner. Prize winners in the golf tourney included the following: low net, H. J. Harp, Jr.; low gross, G. H. Koch, Jr.; hat, G. W. Glenn, Marquardt-Glenn Corp.; special high score, J. H. Lauterbach, Proctor Electric Co.; closest to pin, William Preston; special highest score on hole, E. B. Brown, R. D. Wood Co. Other prizes were distributed to second- and third-place winners in the contest, and each of the 50 members and guests attending the dinner received a door prize.

Laminating Bibliography

An exhaustive bibliography of patents and technical articles on plastics laminating, covering the period 1907 to date, appears in the May issue of *SPE Journal*, the official SPE publication. Some 1,054 references are given under seven main headings: type of resin; applications; fabrication and finishing; fillers; testing and properties; manufacturing; and reviews. Copies may be obtained by writing to the Society of Plastics Engineers, Inc., 409 Security Bank Bldg., Athens, O.

New Vinylite Resin

A NEW vinyl resin, Vinylite dispersion resin XV4, intended for use in the preparation of water-based dispersions, is now commercially available from Bakelite Corp., New York, N. Y. The new resin is quite similar to the VYNV and VYDR grades of Vinylite used in preparing organosol and plastisol dispersions and solution coatings, exhibiting the same extreme toughness and chemical resistance. Being a dry resin from which stable water dispersions can be prepared as required, XV4 avoids many of the problems inherent in handling the usual types of resin latices and offers greater latitude to the formulator. The new resin can be mixed with plasticizer and dispersed in a pebble mill, or on a three-roll mill, and the resulting water dispersions exhibit unusual stability to mechanical agitation, freezing, electrolyte contamination, and to changes upon aging. Pigments, fillers, and stabilizers can be incorporated as desired, and the dispersions can be handled on conventional types of coating equipment. Suggested coating applications include upholstery, shade cloth, carpet backing, paper packaging, washable wallpaper, and floor coverings.

Bakelite has also announced that greatly increased facilities for the production of polyethylene resins are now in operation. According to George C. Miller, company vice president and general sales manager of the thermoplastics department, the new facilities will more than double the amount of polyethylene available. Resins in a wide range of colors and molecular weights are being made at the new production facilities at South Charleston, W. Va., operated by Carbide & Carbon Chemicals Corp., another unit of Union Carbide & Carbon Corp. When the rated capacity of the new facilities is reached in the very near future, the production of polyethylene for the entire industry will reach approximately 50,000,000 pounds a year, as compared with about 15,000,000 pounds last year, Mr. Miller said.

Beetle Prices Reduced

A REDUCTION in the price of Beetle plastic in Bureau of Standards colors to 31¢ per pound, in any quantity of one drum or more, was announced by the plastics department, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. This replaces a price scale under which the 31¢ price applied only to shipments of 30,000 pounds or more, while smaller quantities cost an additional one-half to one cent per pound. The company also stated that it has made a study of the demand for each of the Bureau of Standards colors and is now in a position to make relatively prompt deliveries from stock.

Geon Plastic Pellets

THE manufacture of certain Geon plastic extrusion compounds in uniform cubical shapes, shown by field tests to offer users improved uniformity and better quality control of their products, was announced by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O., through J. R. Hoover, vice president—sales. Geon plastics are plasticized polyvinyl chloride resin compounds sold in ready-to-use form for extrusion, calendering, and molding.

In the wire and cable industry the new cubical granules are expected to increase considerably the efficiency of the extrusion operation and the quality of the vinyl insulation. The uniform cubes make possible more even and complete heating and also minimize porosity sometimes caused by entrapped air. The result of a new method of granulation recently developed by the company, the Geon plastic cubes are available at no extra cost.

Paraplex Aging Study

THE stability under continued high heat of Paraplex G-25 and G-50 polymeric plasticizers was shown in aging tests recently conducted by the Resinous Products Division, Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa. These tests were made to determine the adaptability of these resins as plasticizers for vinyl compounds used in wire insulation subjected to high temperatures.

A series of Paraplex G-25 and G-50 stocks was aged for five and 12 days at 120° C. and evaluated for retention of physical properties, using tensile strength and ultimate elongation as criteria of heat stability. Obviously such a test measures volatility as much as heat stability, and any loss of plasticizer will appear as a change in tensile and elongation values.

The test formulations and milling conditions were as follows:

	Compound A	Compound B
Geon 101	60 parts	60 parts
Paraplex G-25	40	..
G-50	..	40
Basic lead carbonate	5	5
Stearic acid	0.5	..
Total mixing time, min.	12	11
Banbury steam pressure, p.s.i.	60	60
Temperature, °F.	310	310
Milling time, min.	5	5
Temperature, °F.	300	300

Results obtained were as follows:

	Compound A	Compound B
Original		
Tensile strength, p.s.i.	2,180	2,350
Elongation, %	250	320
Aged 5 days at 120° C.:		
Tensile strength, p.s.i.	2,350	2,420
Elongation, %	290	320
Aged 12 days at 120° C.:		
Tensile strength, p.s.i.	2,100	2,240
Elongation, %	290	300

After 12 days' aging neither stock showed substantial changes in elongation or tensile strength, a degree of stability not approached by monomeric plasticizers included in the test. Stocks in which these monomeric esters were used were too brittle to be tested after five days of aging. It appears that their inherent volatility is partially responsible for their failure at high temperatures.

Panelyte Contest Winners

WINNERS of the decorative plastic design contest sponsored by the Panelyte Division, St. Regis Paper Co., New York 17, N. Y., were announced by C. R. Mahaney, company vice president and Panelyte general manager. The $500 first prize was awarded to Miss Julia Clendenin, Miami Art School student; while the second prize of $250 was won by Jesse L. McIver, student at Howard University. The panel of judges, including leading decorators and designers, also selected 10 recipients of the $25 honorable mention awards. Students participating in the contest represented leading art and design schools throughout the country. According to Robert C. Prall, Panelyte decorative sales manager and contest director, the winning designs "definitely represent a new approach in design thinking" for surfaces of the laminated resinous plastics being used in an increasing number of decorative applications.

Shaping Aircraft Canopies

THE Rotoformer, a massive aerial centrifugal machine for shaping plastic canopies of the largest sizes yet designed for military aircraft of all types has been designed, installed, and placed in production by scientists of the Goodyear Aircraft Corp., Akron, O., it was announced by T. A. Knowles, vice president and general manager. Shaping of aircraft Rotoform canopies is accomplished by high-speed spinning of Plexiglas sheets that have been heated to a soft and pliant state, causing them to assume their final shape by centrifugal force. The process is said to be the only known method by which optically clear Plexiglas canopies can be made in shapes that do not conform in cross-section to the arc of a perfect circle. The Rotoform process produces canopies with cross-sectional contours that are geometrically close to parabolic shapes, thereby permitting them to be fitted into aircraft with maximum streamlining.

Reynolon Price Reduction

A 5% to 16% reduction in the price of Reynolon 2000 film, its standard vinyl film in 1.75-two- and three-mil gages, was announced by the plastics division of Reynolds Metals Co., New York, N. Y. The manufacturing economy which made this reduction possible permits the continued manufacture of the film by the cast method, which is claimed to give better control of gage tolerance and high physical strength per mil of thickness than do other methods of manufacturing film. The Reynolon 2000 series will embrace approximately 27 colors, including a transparent matte and metallics, and at new lower prices is expected to find new uses as draperies, bowl covers, machinery covers, shower curtains, and other items.

Joseph D. Dreyfuss recently joined William Whitman Co., Inc., 261 Fifth Ave., New York, N. Y., as sales manager of the plastics division, in charge of the merchandising and distribution of the production of Whitman Plastics, Inc., Lynn, Mass. For the past two years Mr. Dreyfuss had been sales manager in charge of the plastics division of Susquehanna Mills, Inc. Previously he had operated his own cotton and rayon converting business after his discharge from the Armed Forces, during which service he had been active in the procurement of textiles.

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Scientific and Technical Activities

Emphasis on Test Methods at Rubber Division, C.I.C., Meeting

Head Table at Rubber Division, C.I.C. Dinner *(Left to Right)*: Don Walker, Dunlop; G. Stevens, Goodyear; N. Smith, Dominion Rubber; J. T. Black, Polymer Corp.; G. Aitken, Waterous Co.; K. P. Chamberlain, Gates Engineering; H. G. Deline, Dunlop; J. Ramsey, Gutta Percha & Rubber; Garnet Page, C.I.C.; B. Marr, Dominion Rubber

THE meeting of the Rubber Division of the Chemical Institute of Canada, held separate from the meeting of the parent Society, attracted an attendance of about 75 members and guests to the Royal Connaught Hotel, Hamilton, Ont., June 10. Eight papers were presented at the technical sessions during the morning and afternoon of that day, and at a dinner in the evening. K. P. Chamberlain, Gates Engineering Co., New Castle, Del., spoke on his experiences in Europe in connection with his work in providing rubber tank lining installations for pulp and paper mills in Scandinavian countries.

In several of the papers given at this meeting the emphasis was on testing methods, with special reference to the need of better means of approximating factory processing in the laboratory. With new polymers and higher mixing temperatures in the factory, the present laboratory evaluation methods for determining the processability of these new polymers might be considered inadequate, it was said.

H. G. Deline, Dunlop Rubber Co., Ltd., chairman of the Division, presided at the technical sessions and at the dinner which followed. In his remarks at the opening of the meeting he explained that not enough interest had been evinced by members of the Rubber Division in the annual meeting of the C.I.C., which had been held in Halifax, N.S., earlier in the year, and the separate meeting at Hamilton had therefore been arranged.

The Technical Sessions

Although abstracts of the papers presented were published in our May issue, some additional comment on these papers will be made.

In his paper on the plasticity of reclaimed rubber, F. L. Kilbourne, Xylos Rubber Co., showed results obtained with the Mooney, Williams, and Firestone extrusion apparatus and also results of a milling test in the 3A Banbury. He explained that there was no generally adopted plasticity test for reclaimed rubber, and in his results gave data on the probable error of average and single tests for the several plasticity methods. He added that since it could be shown that there was generally a 16% difference in plasticity between the center and the edge of a slab of most reclaimed rubber, samples should always be taken from the same place, preferably from the edge. It was said that the milling test was considered to be more a measure of elasticity than plasticity, but was of definite value when used with the plasticity determinations in order to obtain an overall evaluation of a given reclaimed rubber.

W. H. Schmalz, Dominion Rubber Co., Ltd., showed the value of statistical techniques in correlating specifications, production, and inspection in the rubber industry.

E. B. Storey, Polymer Corp., Ltd., pointed out that by making measurements of flex life and heat build-up of vulcanizates of various polymers at the same stiffness rather than at the same cure, the accuracy of these determinations could be improved. By testing new polymers against a reference polymer with this factor taken into account, more satisfactory evaluations of new polymers could be obtained on limited quantities of the experimental polymers.

S. T. Einhorn, Polymer Corp., compared the work of the U. S. Government Evaluation Laboratory, The B. F. Goodrich Co., and Goodyear Tire & Rubber Co., on analyzing new polymers in the laboratory for their ability to process satisfactorily in the factory and stated that the correlation between laboratory and factory processing was not good for many of these new polymers. Present laboratory equipment is not capable of duplicating factory conditions, and new processing and testing equipment capable of operation over a much wider range is very much needed, this speaker concluded.

G. W. Flanagan, B. F. Goodrich Chemical Co., presented some interesting data on Hycar P.A., a polyacrylic ester-type polymer with good moldability and high water and temperature resistance, which is useful for many applications requiring properties midway between silicone rubbers and other previously available rubbers.

This speaker also showed results of a comparison of nitrile rubber, Hycar P.A., Geon resins, and blends of plastics and rubbers, all in the latex form, for use as paper saturants.

Nitrile rubbers as additives for phenolic resins were also described. Phenolics could not be mixed with nitrile rubbers in the slab form so that nitrile rubber in powdered form was developed for this use.

In a talk on training in industry, D. H. Stevens, Goodyear Tire & Rubber Co. of Canada, Ltd., stated that training for technical and administrative posts must be supplemented by training in the skill of understanding the human mind. "Human engineering," as this latter skill is sometimes called, is becoming increasingly important to industrial management, it was stated.

H. A. Braendle, Columbian Carbon Co., in discussing the inadequacy of laboratory methods for the evaluation of natural and synthetic rubbers, first reviewed the comment in the literature on laboratory mixing from 1914 to the beginning of the late war. He pointed out the lack of detailed mixing specifications until the Office of Rubber Reserve set them up for synthetic rubber. These latter specifications, however, prescribe mixing temperatures of 120-130° F.; while present factory mixing is done at temperatures from 300 to 400° F. The Columbian Carbon laboratory is therefore moving toward higher laboratory mixing temperatures, and data were presented to show that physical properties of GR-S stocks are not much different when mixed at 375° F., as when mixed at 240° F. The difference in the behavior of carbon black tread stocks of synthetic, as compared with natural rubber, during high-temperature mixing was also discussed. It was concluded that a revision of laboratory mixing technique to bring it in line with factory conditions was very much required if future laboratory evaluations were to be of value.

M. Mooney, United States Rubber Co., in describing a new apparatus for determining the hysteresis of rubber over a wide range of amplitudes and frequencies also reported results with natural and five commercial synthetic rubbers. He explained that he believed that hysteresis in rubber was due to effects not linear in relation to frequency, amplitude, and temperature. Data obtained with the new apparatus were compared with that obtained with the torsional pendulum apparatus which was designed by R. H. Gerke and Dr. Mooney several years ago and were found to be in fair agreement.

The Business Meeting

At the business meeting of the Division several amendments to the constitution were approved. These amendments included provisions to change the nominating committee from three members to the three past chairmen, to permit meetings of the Division separate from that of the C.I.C., change of the term of office for executive committee members from three years to one year, and the removal of the limitation on the period of service on the executive committee for any member.

Officers nominated and elected for the period beginning at the end of the Hamilton meeting and ending with the completion of the next annual meeting follow: chairman, J. Ramsey, Gutta Percha & Rubber, Ltd.; vice chairman, J. T. Black, Polymer Corp.; secretary-treasurer, N. W. Smith, Dominion Rubber. Members of the executive committee are: G. Stevens, Goodyear of Canada; B. Marr, Naugatuck Chemical Co., Ltd.; and M. Reinhart, B. F. Goodrich Rubber Co. of Canada, Ltd.

Division Dinner

At the Division dinner Chairman Deline first introduced those seated at the head table to the members and guests present. He then expressed his appreciation to M. F. Anderson, Dominion Rubber; Gordon Smye, Firestone Tire & Rubber Co. of Canada, Ltd.; and Messrs. Black and Ramsey for their work in connection with the Hamilton meeting.

Mr. Deline next presented Garnet Page, general manager, C.I.C., who spoke on the progress of the Institute during the last year and made special reference to its new journal, *Chemistry in Canada*, publication of which began with the issue which was dated April, 1949.

The speaker of the evening, Mr. Chamberlain, was introduced by George Aitken, Waterous Co., Ltd., which company is associated with Gates Engineering, of which Mr. Chamberlain is vice president and sales manager.

The speaker devoted most of his talk to his personal experiences in Finland, Norway, and Sweden during the past three or four years. He feels that these countries and other parts of Europe had made remarkable progress with the use of vinyl resins and plastics, and he exhibited nuts and bolts made from plastic of French origin. He added that European countries are very much interested in what is being done in Canada and the United States with rubbers and resins.

Following his talk, Mr. Chamberlain, an expert magician, entertained the audience for more than an hour.

Solar Heating Discussed

A TALK on "Solar Heating," by George Lof, dean of chemical engineering, University of Denver, featured the May 19 dinner meeting of the Gates Technical Club. Attended by 59 members and guests, the meeting was held at the Oxford Hotel, Denver, Colo., and preceded by a cocktail hour. Dr. Lof gave a very interesting talk on the stages of development of solar heating, using as illustrations slides of various installations and houses built for research on this subject. In certain parts of the country at present, solar heating can be installed in new houses at a cost slightly above that of regular heating units and can be paid for by the resultant savings in heating costs over a period of some 15 to 20 years.

Southern Ohio Group Outing

THE Southern Ohio Rubber Group held its regular summer outing on June 4 at Edelweiss Park, near Dayton. The program, arranged by a committee headed by R. R. Hickernell, Inland Mfg. Division, General Motors Corp., began at noon and included a cafeteria-style picnic lunch, baseball, softball, horseshoe pitching, volley ball, and other sports, followed by a card party and drawings for door prizes. A "blind bogie" golf tournament, under the chairmanship of R. B. Sucher, also of Inland Mfg., was held during the morning at Madden Park Golf Course. Some 20 prizes, golf club covers or golf balls, were distributed to contestants in the golf tournament, and the drawing for door prizes included 20 gifts ranging from liquor to white enamel.

New York Group Outing

THE New York Rubber Group held its annual outing on June 16 at Doerr's Grove, Millburn, N. J., where the facilities and food proved so satisfactory last year. Perfect weather prevailed, and the 162 members and guests who attended the outing enjoyed an afternoon of games, with plenty of refreshments, followed by an evening dinner. The outing was acclaimed as one of the most successful in the Group's history, and much credit must be given to the arrangements committee under M. R. Buffington, Lea Fabrics, Inc.

Following dinner, prizes were awarded to winning contestants in the various games and contests: *three-legged race*, R. J. Marles and M. J. D'Asaro, both of Wolf-Alport Chemicals, Inc.; *fat man's race*, S. Rutkowski, Sindar Corp.; *basketball throw*, G. N. Brunt, Flintkote Co.; *egg throw*, V. H. Perrine, Thiokol Corp., and H. K. Encke, Bancroft-Hickey Mfg. Co.; *shoe race*, Dick Kriney, Advance Solvents & Chemical Corp.; *tug of war*, team captained by P. P. Murawski, E. I. du Pont de Nemours & Co., Inc.; *baseball throw*, S. G. Paliska, Pioneer Latex & Chemical Co.; *softball*, team captained by T. F. Cathey, American Hard Rubber Co.; *horseshoe pitching*, W. F. Lamela, Okonite Co., and Mr. Buffington; *darts*, Irving Polhemus, Flintkote Co.; and *boccie*, Messrs. Margles and D'Asaro.

Mr. Brunt handled the three-legged race, basketball throw, shoe race, and baseball throw; H. G. Eckhardt, Lea Fabrics, was in charge of the fat man's race, egg throw, and tug of war; B. A. Wilkes, Herron Bros. & Meyer, handled the softball tournament; Mr. Lamela took care of the horseshoe pitching contest; darts were handled by M. E. Lerner, *Rubber Age*; and R. B. Carroll, R. E. Carroll, Inc. was in charge of the boccie tournament.

Plans for Golf Tourney

The annual golf tournament of the New York Rubber Group will be held at the fine Winged Foot Golf Club, Mamaroneck, N. Y., on Tuesday, August 9, with E. B. Curtis of R. T. Vanderbilt Co., as chairman of the committee. There will be plenty of fine prizes. Detailed announcement has been sent to all Group members.

Panel on Rubber Problems

A PANEL discussion on rubber compounding and other problems featured the May 26 dinner-meeting of the Northern California Rubber Group, held at the Hotel Claremont, Berkeley, and attended by some 40 members and guests. Questions from the floor and others previously submitted by mail were answered by a panel composed of R. E. Morris and J. W. Hollister, both of Mare Island Naval Shipyard; Grover S. Ramsey, Grove Regulator Co.; J. A. Liljegren, Pioneer Rubber Mills; and R. D. Kettering, Oliver Tire & Rubber Co. Don Good, American Rubber Co., acted as moderator. Some of the topics discussed were water absorption, cold rubber mixing, storage of crude rubber, deterioration caused by copper, distinguishing between types of rubber, and others.

In the business session it was announced that the Group's golf tournament will be held June 30 at the Richmond Course, Berkeley. Plans for the annual summer outing are being made and will be announced at an early date.

Army Rainwear Development

WHEN the supply of natural rubber was cut off in 1941, it became necessary to provide an adequate substitute for coating rainwear fabrics for military use. At first, drying oils were used to coat fabrics, but the resulting oilskins proved unsatisfactory. Synthetic resins of two types were then developed and used during the war, but salvage studies later conducted by the Quartermaster Corps indicated that these resins did not come up to expectations.

The best performing material to date is a coating of GR-S on cotton sheeting, dyed to the required color. This material has good stability to outdoor exposure, good abrasion resistance, fair tear resistance, and suffers no significant deterioration upon exposure to high temperature and humidity. In uncured form it is easily handled in commercial machinery and lends itself to assembly by vulcanizing seams. Work under way is intended to develop a dependable stitch and cemented seam equivalent to the vulcanized seam. One of the main objections, however, to the GR-S fabric is its weight. The present garment performs satisfactorily in light rain, but further improvement is needed in protection against continued or heavy rains. The Research & Development Branch, Office of the Quartermaster General, aims to resolve both problems by developing a lightweight garment that affords complete protection against heavy rains and also permits easy elimination of body moisture.

Akron Group Frolics in Rain

A DAY-LONG rain failed to dampen the spirits of the 596 members and guests of the Akron Rubber Group who attended the annual outing on June 17 at Firestone Country Club. The plug casting tournament, with 40 contestants, was the only one of several outdoor events to be held, with prizes being awarded to J. H. Porosky, General Tire & Rubber Co., Willard Haas, The B. F. Goodrich Co., and H. P. Owen, B. F. Goodrich Chemical Co. No prizes were awarded in the golfing events held because of the varying conditions that prevailed during the day. Instead of outdoor activities, the attendance indulged in various indoor sports and games, followed by a buffet dinner and a drawing for more than 300 door prizes contributed by some 149 rubber and supplier companies.

William H. Ayscue, E. I. du Pont de Nemours & Co., Inc., was general chairman of the outing and was assisted by C. N. Lehto, Goodyear Tire & Rubber Co.; L. V. Cooper, Firestone Tire & Rubber Co.; C. F. Wimmer, Phillips Chemical Co.; Roy H. Marston, Binney & Smith Co.; and E. L. Stangor, du Pont.

Catton Again a Speaker

NINETY-SIX members and guests of the Philadelphia Rubber Group attended a dinner meeting on June 3 at the Poor Richard Club, Philadelphia, Pa. Speaker of the evening was Neil L. Catton, E. I. du Pont de Nemours & Co., Inc., who discussed "Processing Characteristics of Neoprene," using slides to illustrate his talk. Mr. Catton's talk was identical with that which he gave before the February 11 meeting of the Connecticut Rubber Group, reported in our March issue, page 737.

Resins in Rubber

A REGULAR dinner-meeting of the Chicago Rubber Group took place on May 20 in the Morrison Hotel, Chicago, Ill., with some 120 members and guests attending. Technical speakers were J. C. Searer, Durez Plastics & Chemicals, Inc., who discussed "Phenolic Resins in the Rubber Industry," and M. E. Jones, Marbon Corp., who delivered a paper on "A High Styrene Reinforcing Resin—Marbon 8000," by C. R. Holt, A. G. Susie, and M. E. Jones, of the same company. An after-dinner talk, "The Editor Faces the Atom," was given by E. L. Shainmark, managing editor of the *Chicago Herald-American*.

Mr. Searer stated that phenolic resins are being used in ever-increasing amounts with all types of natural and synthetic rubbers, and the use of rubber in phenolic molding compounds is also being investigated. In rubber the phenolic resins give improved tensile strength, hardness, and resistance to abrasion, oil, and solvents, and aid processing. In rubber latices phenolics have been used in paper treatment, laminating, manufacture of gaskets, and other applications. In rubber adhesives phenolics give high heat resistance, better adhesion, and improved toughness when brake linings are bonded to shoes, linoleum to wood, and shoe soles to uppers.

Mr. Jones described the use of Marbon 8000 in many types of rubber compounds to obtain higher hardness, greater stiffness, lower compression set, and better tear and flex cracking resistance. Other advantages of the resin are ready incorporation and dispersion in the rubber mix; improved mixing and molding of the rubber stock; good dielectric properties; low water absorption; good light and heat aging properties; and a wide range of color possibilities.

In the business session, results of the letter balloting for Group officers for the 1949-1950 season were announced, as follows: chairman, Walter H. Peterson, Enjay Co.; vice chairman, Paul F. Niessen, Victor Mfg. & Gasket Co.; and secretary-treasurer, Maurice J. O'Connor, C. P. Hall Co. In addition to the new officers, other members of the board of directors are: H. E. Andersen, B. F. Goodrich Chemical Co.; R. E. Elliott, Indoil Chemical Co.; J. B. Ledden, E. I. du Pont de Nemours & Co., Inc.; R. K. Opper, Naugatuck Chemical Division, United States Rubber Co.; L. W. Heide, Acadia Synthetic Products Division, Western Felt Works; V. J. La Brecque, Victor Mfg.; C. H. Skuza, Inland Rubber Co.; and Walter Wood., W. H. Salisbury Co. Copies of the Group's new 1949 Year Book were distributed, and appreciation was expressed to the book committee headed by Mr. O'Connor.

New Glycols Available

THE initial synthesis of two new glycols, 2-methoxymethyl-2-4-dimethyl pentanediol-1,5 and 2-ethoxymethyl-2,4-dimethyl pentanediol-1,5, was announced by Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. These pentanediols combine the chemical characteristics of glycols and glycol-ethers. The two hydroxyl groups in the 1,5 positions make them of special interest for the manufacture of maleic and other alkyd resins, plasticizers, and elastomers. The ether groups confer solubility characteristics which make them useful as coupling agents, and as solvents for protective coatings, adhesives, hydraulic fluids, etc. The water solubility and low volatility of the new diols suggest their use as softeners or plasticizers for casein, zein, and other water soluble resins. 2-Methoxymethyl-2,4-dimethyl pentanediol-1,5 is a plasticizer in the milling, molding, and casting of nylon when used in concentrations between 15 and 25% by weight, based on the total resin composition.

Elastic Colloid Research Corp. Laboratory at M.I.T.

THE Elastic Colloid Research Corp., formed by the Rubber Heel & Sole Manufacturers Association, New York, N. Y., in August, 1948, to correlate the fundamental research activities and interests of many independent heel and sole companies, dedicated a new laboratory at the Massachusetts Institute of Technology, Cambridge, Mass., on May 23. This laboratory will be associated with the R. S. Crawford Memorial Graduate Research Fellowship, which will be awarded to an advanced student for work on rubber and plastic problems. The Crawford Fellowship, also provided by Elastic Colloid, will cover the tuition and living expenses of its holder. The Fellowship was instituted in memory of the late R. S. Crawford, former president of the Rubber Heel & Sole Manufacturers Association.

Ernst A. Hauser, professor of chemical engineering at M.I.T., will be director of the new laboratory.

At the dedication of the laboratory the afternoon of May 23, Raymond Drake, president of Elastic Colloid, James R. Killian, Jr., president of M.I.T., and Dr. Hauser were the principal speakers. Mrs. R. S. Crawford thanked the members of the Association for making this memorial to her husband possible. D. S. le Beau, of Midwest Rubber Reclaiming Co. and former associate of Dr. Hauser at M.I.T., also spoke briefly on the advantages to the heel and sole industry of the new laboratory.

In his talk, Mr. Drake, who is also president of Avon Sole Co., emphasized that the number and the quality of men trained in the rubber and plastics field are expected to be increased as a result of the work of the new laboratory. Speaking for M.I.T., Dr. Killian pointed out that the laboratory and the Crawford Fellowship would provide the Institute with new facilities for the study of rubber and plastics, with emphasis on the field of fundamental research.

The new laboratory is equipped with the latest types of machinery and testing apparatus used in the rubber industry and provides facilities for a wide range of research in the scientific and technological field of natural and synthetic rubber and plastics. A laboratory Banbury mixer equipped with a four-speed drive and applicable for reclaiming operations as well as mixing, a Preco press, and a six-by 12-inch Farrel-Birmingham two-roll mill are included in the equipment of the new laboratory.

The firms associated in Elastic Colloid are: Avon Sole Co., Avon, Mass.; Beebe Rubber Co., Nashua, N. H.; Bradstone Rubber Co., Woodbine, N. J.; Cat's Paw Rubber Co., Baltimore, Md.; Gro-Cord Rubber Co., Lima, O.; Hagerstown Rubber Co., Hagerstown, Md.; Alfred Hale Rubber Co., North Quincy, Mass.; Ideal Rubber Heel Mfg. Co. and Panther-Panco Rubber Co., both of Chelsea, Mass.; Monarch Rubber Co., Baltimore; and Victor Products Corp., of Penn., Gettysburg, Pa.

Rubber Product Quality Standards

A PROGRAM to establish standards of quality for the inspection of visible imperfections occurring in various rubber products has been initiated by the Bureau of Ships, United States Navy Department. The compilation of such information for rubber hose is given in the specification, "Standard Inspection Procedure for Rubber Hose," NavShips 250-344, dated April 1948, and requests were received for the extension of this work to other Navy-procured rubber material.

The program covers the following products: (1) gaskets and packing, including molded, sheet, strip, inserted, impregnated, or combination stock; (2) cellular rubber; (3) gloves; (4) footwear; (5) bearings and bearing strips; (6) matting; (7) deck covering; (8) hard rubber articles; (9) shock, vibration, and sound attenuation mounts; (10) cables; (11) shaft covering; (12) sea chest coatings; (13) coverings for rudders, struts, and similar underwater surfaces; (14) submarine battery compartment linings; (15) pipe linings; (16) tires; (17) goggles, masks, and similar safety equipment; (18) life belts, boats, etc.; (19) self-sealing tanks; (20) rubber tubing; (21) rubber and/or plastic coated and impregnated fabrics; and (22) miscellaneous molded items, including crutch tips, chair tips, and other small articles.

It is planned to collect samples in these categories showing all types of major and minor defects which may occur in the daily manufacturing processes of these products. To provide a comprehensive survey the desired samples will include those having defects or conditions which normally would cause rejection before coming to the attention of final inspectors. Wherever the size and the weight of the rubber items permit, representative samples will be collected from manufacturers by Navy inspectors who will forward them to the New York Naval Shipyard for photographing. All other items will be photographed at the place of manufacture.

Samples and/or photographs will then be submitted to the Bureau of Ships for final evaluation, classification, and typing. The final classification of defects will be made by committees representing industry, the Bureau, and the Naval Inspector's Offices concerned. When all photographs have been satisfactorily classified and compiled, visual inspection guides will be prepared from this material and distributed to all interested parties.

New Cyanamid Chemical

THE pilot-plant production of cyanuric chloride has been announced by the new product department of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Used abroad for the preparation of dyestuffs and optical bleaching agents, the material also offers possibilities for the syntheses of high polymers, rubber chemicals, plasticizers, surface active agents, pharmaceuticals, and other products.

Cyanuric chloride is a solid melting at 146° C. and boiling at 190° C. without decomposition. It is hydrolyzed by water, in which it is very slightly soluble, and is soluble in most organic solvents. The chemical possesses a high degree of reactivity, somewhat resembling a carboxylic acid chloride, and reacts readily with compounds having labile hydrogen atoms, such as amines, alcohols, phenols, mercaptans, and malonic esters.

Ontario Group Plays Golf

APPROXIMATELY 63 members and guests of the Ontario Rubber Section, C.I.C., attended the annual golf outing on June 11 at Rouge Hills Golf & Country Club, Rouge Hills, Ont., Canada. The outing program consisted of an afternoon golf tournament, followed by a dinner in the evening. Retiring Chairman D. H. Walker, Dunlop Tire & Rubber Goods Co., presided over the dinner and, with Paul Hooper, H. L. Blachford, Ltd., was in charge of arrangements for the outing.

Following dinner, Mr. Hooper, as chairman of the nominating committee, announced the following slate of candidates for officers of the group, who were then unanimously elected: chairman, Stuart M. Murray, Joseph Stokes Rubber Co., Ltd.; secretary-treasurer, F. R. Gorrie, Delacour-Gorrie Co., Ltd.; and executive committee, L. G. Webber, Firestone Tire & Rubber Co. of Canada, Ltd., E. A. Kent, Canada Wire & Cable Co., Ltd., and H. Pletch, B. F. Goodrich Rubber Co. of Canada, Ltd.

The outing concluded with the awarding of 24 prizes to winning contestants in the golf tournament and a drawing for 19 door prizes. Ross Dennis, Canada Carbon Co., Ltd., presented a lovely trophy to the group for annual award to the low gross winner in the golf competition. The trophy was won this year by William Moncur, Seiberling Rubber Co. of Canada, Ltd.

CALENDAR

- **July 30.** Buffalo Rubber Group. Summer Outing. Lancaster Country Club.
- **Aug. 9.** New York Rubber Group. Golf Tournament. Winged Foot Golf Club, Mamaroneck, N. Y.
- **Sept. 17.** Connecticut Rubber Group. Annual Outing. Scollins Grove, Long Hill, Conn.
- **Sept. 18-23.** American Chemical Society. Atlantic City, N. J.
- **Sept. 21-23.** Division of Rubber Chemistry, A.C.S. Chalfonte-Haddon Hall, Atlantic City.
- **Sept. 21.** New York Section, SPE. Hotel Shelburne, New York, N. Y.
- **Sept. 28-30.** American Society of Mechanical Engineers. Fall Meeting. Erie, Pa.
- **Oct. 4.** The Los Angeles Rubber Group, Inc.
- **Oct. 7.** Detroit Rubber & Plastics Group, Inc. Detroit-Leland Hotel, Detroit, Mich.
- **Oct. 10.** Upper Midwest Section, SPE.
- **Oct. 10-14.** ASTM. National Meeting. Fairmont Hotel, San Francisco, Calif.
- **Oct. 11-12.** ASTM Committee C-16 on Thermal Insulating Materials. Atlantic City, N. J.
- **Oct. 11.** Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.
- **Oct. 14.** Boston Rubber Group. Somerset Hotel, Boston, Mass.
- **Oct. 19.** South Texas Section, SPE.
- **Oct. 19.** New York and Newark Sections, SPE. Joint Meeting. Hotel Shelburne, New York, N. Y.
- **Oct. 21.** New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
- **Oct. 21.** Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
- **Oct. 24-28.** National Safety Council. Thirty-Seventh National Safety Congress and Exposition. Chicago, Ill.
- **Oct. 25.** Washington Rubber Group.
- **Nov. 17-19.** ASTM Committee D-9 on Electrical Insulating Materials. Atlantic City, N. J.

Additional Experimental GR-S Polymers and Latices

ADDITIONS to the list of experimental GR-S dry polymers and GR-S latices, available for distribution to rubber goods manufacturers under the conditions outlined in our November, 1945 issue, page 237, appear in the table printed below.

Normally, experimental polymers will be produced only at the request of the consumers, and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside, if possible, for distribution to other interested companies for their evaluation. The 20 bales, when available, will be distributed in quantities of one bale or two bales upon request to the Sales Division of Rubber Reserve, or will be held for six months after the experimental polymer was produced, unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received.

These new polymers are experimental only, and the Office of Rubber Reserve does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

X-Number Designation	Manufacturing Plant	Date of Authorization	Polymer Description
X-512-GR-S-SP	U. S. Rubber, Naugatuck	3-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiary butyl hydroquinone. Mooney, 55±5; antioxidant, 1.25% BLE. Polymer coagulated by dilute alum-dilute latex technique.
X-513-GR-S	Goodyear, Torrance	1-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Shortstopped with dinitrochlorobenzene. Mooney, 55±5; antioxidant, 1.25% BLE.
X-514-GR-S	U. S. Rubber, Borger	1-24-49	Copolymer of butadiene and styrene: of the hydrocarbon present approximately 15% is derived from styrene. Polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 731. Shortstopped with ditertiary butyl hydroquinone. Mooney, 50±5; antioxidant, 1.25% BLE.
X-515-GR-S	Firestone, Lake Charles	1-28-49	Same as GR-S-45-AC except shortstopped with 0.05-part hydroquinone. Mooney, 42±4.
X-516-GR-S	General, Baytown	3-4-49	A mixture of 50±2 parts Statex K and 100 parts of GR-S type polymer having a Mooney of 45±4 on the finished unpigmented polymer. Stabilized with 1.5% PBNA.
X-517-GR-S	General, Baytown	2-23-49	A mixture of 50±2 parts Philblack 0 and 100 parts of GR-S type polymer made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Polymer shortstopped with dinitrochlorobenzene. Mooney of the unpigmented polymer, 40±5; stabilized with 1.5% PBNA on the contained polymer.
X-518-GR-S	Goodyear, Torrance	3-1-49	GR-S to be used as standard reference bale, effective March 7, 1949.
X-519-GR-S	U. S. Rubber, Borger	3-14-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiary butyl hydroquinone Mooney, 70±5; antioxidant, 1.25% BLE.
X-520-GR-S	Goodyear, Torrance	3-4-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Shortstopped with 0.15-part dinitrochlorobenzene. Mooney, 55±5; antioxidant, 1.25% BLE.
X-521-GR-S	Goodyear, Torrance	3-4-49	GR-S made at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate #214. Shortstopped with ditertiary butyl hydroquinone. Mooney, 55±5· stabilized with a non-staining type antioxidant R-2019G.
X-522-GR-S	Goodyear, Torrance	3-4-49	Same as X-521-GR-S except polymer is coagulated by diluting latex to 4%—dilute alum technique.
X-523-GR-S Latex	Firestone, Akron	3-23-49	Same as Type II GR-S Latex, except stabilized by the addition of ammonia. pH, 10.0-11.6.
X-524-GR-S	Cancelled		
X-525-GR-S	Goodyear, Torrance	3-24-29	GR-S-AC made in standard plant equipment. Mooney viscosity, 55±4.
X-526-GR-S	Cancelled		
X-527-GR-S	U. S. Rubber, Borger	4-11-49	Mixture of 55 parts Philblack 0, one part RPA No. 3, and 100 parts of GR-S polymerized at reduced reaction temperature and shortstopped with ditertiary butyl hydroquinone. Marasperse used as the emulsifying agent in carbon black slurry make-up. Mooney viscosity of rubber in latex, 50. Stabilized with 1.5% BLE.
X-528-GR-S-SP	U. S. Rubber, Naugatuck	4-20-49	GR-S polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiary butyl hydroquinone. Mooney viscosity, 55±5; stabilized with 1.25% BLE. Polymer coagulated by dilute alum-dilute latex technique.
X-529-GR-S	Goodyear, Houston	4-21-49	A mixture of 50 parts EPC black and 100 parts of low-viscosity GR-S containing 1.5 parts PBNA. Sodium lignin sulfonate-type emulsifying agent used in preparation of carbon black slurry. Mooney viscosity of contained polymer, 37±4.
X-530-GR-S-SP	U. S. Rubber, Naugatuck	4-21-49	GR-S polymerized at reduced reaction temperature with cumene hydro-peroxide activated recipe emulsified with potassium oleate. Shortstopped with ditertiary butyl hydroquinone. Mooney viscosity, 35±5; stabilized with 1.25% BLE. Glue-acid coagulation.
X-531-GR-S	U. S. Rubber, Borger	5-24-49	GR-S polymerized at reduced reaction temperature with cumene hydro-peroxide activated recipe emulsified with Dresinate 731. Shortstopped with dinitrochlorobenzene and hydroquinone. Mooney viscosity, 50±7; stabilized with 1.25% BLE.
X-532-GR-S	U. S. Rubber, Borger	4-29-49	GR-S polymerized at reduced reaction temperature with cumene hydro-peroxide activated recipe emulsified with Dresinate 731 Shortstopped with dinitrochlorobenzene and hydroquinone. Mooney viscosity, 60±5; stabilized with 1.25% BLE.
X-534-GR-S Latex	U. S. Rubber, Naugatuck	5-5-49	Polybutadiene latex shortstopped with tetramethylthiuram disulfide. Total solids, 30±2. pH, 11.0-12.0. Residual styrene, 0.05% max. Mooney viscosity of contained polymer, 93 minimum (MS 4 at 212° F.).

RUBBER WORLD

NEWS of the MONTH

Rubber Industry Investigates ITO Havana Charter; Fourth-Round Wage Negotiations Scheduled for August

Following a detailed discussion of possible future trends in the competition between natural and synthetic rubber by John L. Collyer, president of the B. F. Goodrich Co., before the Society of Automotive Engineers in Detroit, Mich., on May 23, in which efforts of natural rubber producing nations to get us to restrict our production of synthetic rubber were called a threat to our national security and a "cartel road which leads to totalitarianism," The Rubber Manufacturers Association, Inc., scheduled a panel discussion of the ITO Havana Charter for June 28 in New York, N. Y. Bringing together representatives of companies accounting for more than 90% of the nation's rubber consumption, the meeting will be the largest the rubber manufacturing industry has held in more than a decade, the RMA said.

A reduction in passenger-car tire prices of between 5% and 7½% was announced during June by the Big Four companies and General Tire & Rubber Co., Seiberling Rubber Co., and Lee Rubber & Tire Corp. Rubber consumption in May was only about 4% less than during April, but there were indications that the production activity of the industry was more than 4% less.

The possibility that facilities for the production of "cold rubber" black masterbatch in four government-owned GR-S plants will be installed in the near future has been mentioned.

Negotiations between Goodrich and the United Rubber Workers, CIO, union on a wage increase and a company-financed pension plan took place between May 23 and June 15, but were discontinued on the latter date without any agreement being reached. Negotiations between the other three Big Four rubber companies and the union are scheduled for August. Meanwhile much activity has developed within the URW union following the dismissal in May of L. S. Buckmaster as president of the union. Mr. Buckmaster is planning to appeal to the union members for reinstatement at their convention in Toronto, Canada, in September.

Collyer on Rubber Progress

In his talk before the SAE in Detroit, May 23, Mr. Collyer stated that the current campaign by the British, Dutch, and certain other nations to raise the price of natural rubber by getting the United States to restrict its production of synthetic rubber is not only a threat to our national security, but is a "cartel road which leads to totalitarianism."

"The exclusive position which natural rubber enjoyed until near the end of World War II is now a thing of the past," he added. "Healthy competition now exists between the two types of rubber. The need for maximum efficiency on the part of producers competing for sales in the world rubber market is apparent.

"In this situation, the opposition of the British and Dutch and other natural rubber producing nations is not difficult to understand. There can be no doubt that these nations will continue to press for some arrangement whereby the impact of American synthetic rubber upon natural rubber prices is sharply reduced or eliminated, making possible higher natural rubber prices.

"If in order to raise the price of natural rubber it is necessary that all concerned embrace control schemes that tend toward totalitarianism, let no one be misled that any headway is thus being made against the threat of Communism. Instead the reverse may well be true."

A primary contention of the natural rubber producing nations and colonies is that the price of natural rubber is too low to enable recovery of higher production costs and to make possible further expansion of production, it was said.

"The rising cost of production is a familiar fact to all of us. Now that our business cycle has slowed and turned downward, we are, more than ever, attacking our cost-price problems through paring costs and increasing efficiency," Mr. Collyer pointed out.

In contrast, the bulk of the natural rubber-producing industry has traditionally looked to restriction schemes to protect its margins, and many producers have done little to reduce costs and increase efficiency. Greater use of high-yielding rubber trees, consolidation of producing and processing units of native holdings, and simplification of marketing channels were suggested as means of increasing efficiency and reducing costs.

In veiled language the campaign for higher rubber prices is represented to be in accord with the aims for the vitalizing of world trade that are now being urged in some quarters. Also, it is stated that it is keeping with the Administration's program for helping to raise the standard of living of the backward peoples of the world.

Here again, Mr. Collyer thinks the meaning of American policy is being misunderstood or misconstrued. American policy is founded on our conviction that incentives, competitive enterprise, and "know-how" will produce the best and most lasting results. Conditions are favorable, with the aid of American "know-how," for the fostering of progress for those engaged in the rubber industry—through the free play of competition. Conditions are favorable because the market potential is great.

In the discussion of devices proposed for attaining the price goals of the natural rubber producers it was asked to what extent the larger participation of governments in cartels — as is suggested — would guarantee against the recurrence of the threat to military security in rubber of freedom-loving nations. There is no magic ingredient that government can supply to maintain the vigor of competitive enterprise when it is cartelized. The likelihood is that, by their very size and unwieldiness, super-cartels, which may have begun merely as efforts to boost a price here or there, will exercise a more stultifying effect on the economy of nations that would even privately operated cartels, it was added.

The following objectives were recommended by Mr. Collyer in restating our rubber position: (1) Not only the people of the United States, but other peoples, also, want an ample supply of low-cost, high-quality rubber products. (2) They want increasingly higher living standards to which the rubber industry's progressiveness can continue to make rich contributions. (3) They want to benefit from continued technological progress. (4) They want to be absolutely certain that in terms of rubber, national security is at all times assured.

It is not essential from a military security standpoint that we produce more synthetic rubber than our national policy states, but if we should, for any reason, restrict the voluntary use of synthetic rubber, we must be fully aware of the path that we are then treading, Mr. Collyer emphasized. Let us understand that international controls invite domestic controls.

The policy earnestly desired by the American people is clearly expressed in the Rubber Act of 1948 which states: "It is declared to be the policy of the Congress that the security interests of the United States can and will best be served by the development within the United States of a free competitive synthetic rubber industry."

To return to cartel operations in rubber would be to disregard this fundamental policy and to compromise a basic principle of the Rubber Act which is now law, Mr. Collyer concluded.

RMA Conference on ITO Charter

The RMA announced on June 22 that it would hold a searching conference study of the Havana Charter of the International Trade Organization at the Hotel Roosevelt, New York, on June 28.

Eight of the nation's leading authorities on the charter were scheduled to discuss the merits of the ITO at this meeting, probing the ramifications of the plan in open debate, not only as they may affect the rubber manufacturing industry, but as they may influence all phases of American enterprise. Bringing together representatives of companies accounting for more than 90% of the nation's rubber consumption, the meeting will be the largest the rubber manufacturing industry has held in more than a decade, the RMA said.

The morning session, devoted to the case against the Charter, was scheduled to be presented by Elvin H. Killheffer, formerly vice president of du Pont and adviser to the American delegation at the Havana Conference; Philip Cortney, president of Coty, Inc., and author of "The Economic Munich"; and Michael A. Heilperin, economist for the Bristol-Myers Corp., author of "The Trade of Nations," and delegate for the International Chamber of Commerce to the Geneva and Havana conferences on the International Trade Organization.

The defense of the Charter was scheduled to be presented in the afternoon by William L. Batt, president of SKF Industries, Philadelphia, and chairman of the Commitee for the International Trade Organization; Clair Wilcox, professor of economics at Swarthmore College and former director of the Office of International Trade Policy, United States Department of State; and Morris Rosenthal, president, Stein, Hall & Co., New York.

The morning and afternoon sessions, as well as an evening session devoted to summation and questions, were scheduled to

be handled by Howard S. Piquet, senior specialist in international economics for the Legislative Reference Service of the Library of Congress, acting as moderator. Winthrop Brown, director of the Office of International Trade Policy for the U. S. Department of State, the office of the department responsible for the ITO program, was scheduled to speak on the matter of departmental policy during the evening session.

A summary of the conference will be presented in our August issue.

Humphreys on Business Freedom

Harry E. Humphreys, president of United States Rubber Co., in a talk at the annual meeting of the National Industrial Conference Board in New York on May 25, stated that businessmen must devote more of their time and effort to explaining how the American economic system operates if government control of business is to be averted in the United States.

"The eleventh hour is here for business to speak for itself. Now, and from now on, the men who run American business must devote as much—if not more—time and effort to the public relations of their business as they spend on finance, production, and distribution. Unless they do, they will not need to worry about the latter problems. Government will be glad to handle them all."

To create better understanding Mr. Humphreys urged that every company give its own employes economic information, pointing out that employes comprise the largest group of people with whom management comes into close contact.

In giving economic information to the employe, Mr. Humphreys told the businessmen to speak in terms of the employe's interests and basic wants, including "job security, opportunity to advance, to be treated as a human being, and a belief that his work is important."

In defending free enterprise, the speaker cautioned against giving the impression that business management is against all social progress. People need protection against old age, unemployment and disability, but this protection should come first of all from the thrift of the individual—from his own savings and insurance—and second from voluntary group insurance. Government benefits should come last and should be held down to a minimum.

"When the government takes the lead in developing human aid, a nation's walk down the road to socialism turns into a gallop," Mr. Humphreys concluded.

Natural Rubber Stockpiling

Lockwood's June 15 *Rubber Report* presents information to indicate that the Bureau of Federal Supply has acquired about 150,000 long tons of new rubber since mid-1947, in addition to that turned over to it by the RFC at that time. More new rubber which becomes part of our strategic stockpile is expected to be added to at about the same rate that has prevailed since mid-1947. This conclusion is based on the fact that the Second Deficiency Appropriations Bill (H.R. 4046) and the Fiscal 1950 Treasury and Post Office Appropriations Bill (H.R. 3083), both of which should be passed by Congress by June 30, include provisions for about the same amount of money for natural rubber stockpiling purchasing as last year.

Senator Tydings has introduced a Bill (S 1268) which would provide funds for acquisition of all strategic materials as rapidly as possible until the stockpiling objective for each material has been attained. If enacted into legislation, this bill would alter the present Munitions Board policy for maintaining balance in the percentage of requirements obtained among all the strategic materials and would permit acquisitions of rubber to proceed more rapidly than at present. Advices from Washington, however, indicate that Senator Tydings' bill is not likely to be passed during this session of Congress.

More Tire Price Cuts

The price cut in passenger-car tires started in May by the Standard Oil Co. of Ohio has now been followed by similar cuts by the Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., U. S. Rubber, General Tire, Seiberling, Lee Rubber, and Goodrich.

Price reductions by these companies averaged about 5% to 7½% on first-line passenger-car tires. Manufacturers have fairly heavy inventories of these tires, and sales have not been keeping pace with production levels. Consumers have evidently been holding back on replacement purchases until tire prices were adjusted along with prices of other goods. Original equipment sales have continued at high levels, but replacement market activity makes or breaks the industry, it has been said.

It may be assumed that most of the other tire manufacturing companies will meet these new prices on passenger-car tires.

The Thermoid Co., Trenton, N. J., announced on June 6 a 60-day retroactive guarantee against price reductions on automotive replacement products. The guarantee is effective as of June 1 and continues through December 31.

In a letter to its distributers the company said that in the event that there be any reduction in price between now and December 31, either because of lower costs or because of competitive necessity, the company will make its price reduction retroactive for 60 days from the date it was put into effect. On any purchase made during the 60 days preceding any possible price reduction, the dealer will get a credit to the extent of any difference in price.

The company said the action was designed to help it keep production on an even keel. It will allow distributers to build up depleted stocks and enable them properly to service jobbers and dealers and at the same time protect them from any possible decline in prices.

Current Industry Activity

Although most of the indicators of general business activity in the United States continue to show evidences of declines, automobiles and building construction are supplying much support to the general business situation. The number of persons unemployed is estimated to be about four million, but many of those employed are working fewer hours per week.

The writer of "The Business Climate" section of Lockwood's June 15 *Rubber Report* points out that the most significant revelation of the moment is a decline of five points each for the months of March and April in the general business index of the Federal Reserve Board. The evidence points to a further decline in May, it was added.

With regard to wholesale prices, a slowly declining trend continues, and basic factors indicate that the downward pressure will press prices lower. Barring increased costs as a result of coming wage negotiations, the main pressure factors soon to appear will be surplus crops, increased competition in world trade (expected to be augmented by a decline in the value of foreign currencies), high inventories of manufactured goods yet to be liquidated, and a general hesitancy on the part of the buying public, according to this report.

On farm products, food, textiles, and chemicals, declines have been in force over a longer period of time than for building materials and metals. The real decline for some groups is just getting under way—for example, building materials and metal products. Retail prices, as represented by numerous cut-rate sales, have outdistanced the decline in wholesale prices.

The Federal Reserve Board's fourth annual survey of consumer finances released during mid-June, however, was optimistic regarding the market for consumer goods. Money is available, and demand for many products still continues, but many consumers are delaying their buying in hope of lower prices.

In the rubber industry the regular monthly report of the RMA stated that manufacturers' shipments of passenger-car tires during April totaled 5,666,650 units, an increase of 15.7% over March when 4,897,869 units were shipped. Production of this type-tire also increased during April to 5,939,645 units from 5,361,336 the previous month; while inventories of 10,705,291 units showed little change from the end-of-March figure.

Shipments of truck and bus tires in April declined to 944,093 units from the 1,004,719 units shipped in March. Production was down 16.2% to 1,019,670 from 1,216,167 units for the previous month, but the change in manufacturers' inventories was minor.

Shipments of automotive tubes rose 4.3% in April to 5,396,411 units, against 5,173,772 the month before. Production was up 1.9% to 6,058,992 from 5,947,598 in March, and stocks increased 4.6% to 11,747,607 from 11,230,827 on March 31.

The U. S. Department of Commerce, in a release dated June 20, called attention to the fact that production of passenger and motorcycle tires during the first four months of 1949 was 9% less than for the same period in 1948.

Shipments by manufacturers of passenger-car tires for original equipment during the first four months of 1949 were 17% above deliveries for the corresponding months of last year; while shipments of replacement tires dropped 13% for the same 1949 period.

Stocks of passenger and motorcycle tires in warehouses of manufacturers at the end of April, 1949, were about two million tires greater than in 1948. This inventory represents about a two-month supply of tires, it was said.

Production of truck and bus tires was also 13% less for the first four months of this year, as compared with the same period in 1948. A declining trend for original equipment, replacement, and export shipments of these tires was noted. Inventories of truck and bus tires in manufacturers' warehouses represented about a 2½ months' supply.

Production of farm tractor and implement tires was similarly lower, and manufacturers' inventories represented about 1½ months' supply, it was said. Camelback production was at a higher level for April, 1949, as compared with April, 1948, to the extent of 42%, and it was suggested that this condition reflects the tendency of tire users to resort increasingly to recapping used tires rather than purchasing new ones.

In the mechanical goods and footwear branches of the industry, production in May and June continued lower by varying amounts, depending on the plants concerned. Two or three plants in the eastern section of the country visited by members of the staff of India Rubber World during that period gave evidence of somewhat re-

duced production activity. The general outlook for mechanical goods production was still considered good for the remainder of the year.

According to advice from one manufacturer of rubber footwear, the use and the sale of footwear during the past winter were not very great because of the open winter that prevailed over a large part of the country, and, as a result, footwear plants are operating on reduced schedules. Advance ordering by jobbers is very slow, and should the 1949-50 winter arrive early, a shortage of waterproof footwear could develop. An increase in the amount of advance buying would be most helpful to all concerned, it was said.

Some interest exists in tennis shoes, and many of the footwear plants are fairly busy in the manufacture of this item. There has recently been introduced a canvas top shoe that has the sole and foxing molded on in a press, in contrast to the conventional method of manufacture, and this new shoe is being accepted quite well. A similar type shoe is being manufactured in Mexico, and application for a U. S. patent has been made.

Other new products attracting attention for the footwear industry are waterproof cowboy boots for youngsters and Sun Valley type of women's gaiters in various colors and styles. A latex dipped shoe for infants and children introduced during the past winter and a similar shoe fabricated from polyvinyl chloride for the same purpose are both sources of new business, our adviser states.

United States exports of rubber and rubber products for April were valued at $10,-269,506, as compared with $10,991,679 in March and $12,465,174 in April, 1948, the Department of Commerce reported on June 14.

Analysis of Bureau of Census figures by the Office of Domestic Commerce indicates that April reclaimed rubber exports were the highest this year. Synthetic rubber exports at $403,826 were well below the $787,-827 posted in March, but remained above the 1948 monthly average. Scrap rubber exports declined to $57,008, the lowest in six months, and shipments of footwear, soles, and heels dropped to $234,844, the lowest figure that has been recorded in many months.

Exports of passenger-car tires was the highest since January and were valued at $629,510. Shipments of off-the-road tires, valued at $391,123, were the highest of the year, and exports of farm tractor and implement tires, though showing a decline to $673,074 from the $757,863 reported in March, exceeded the figure for passenger-car tire exports.

Value of exports in the first four months of 1949 were $42,069,082, down 14.7% from the $49,346,946 reported for the same period of 1948. Dollarwise, the greatest decline has been in mechanical rubber goods and passenger-car, truck and bus tires. Exports of synthetic rubber, on the other hand, have shown an appreciable gain.

The RMA reported on June 27 that new rubber consumption for May in the United States was estimated at 81,028 long tons, a reduction of 3.8% from the April figure of 84,206 tons. Natural rubber consumption during the month was down about 4% to 45,710 tons, as against 47,600 tons for the previous month. Synthetic rubber consumption was down 3.5% during the same period to 35,318 tons, as compared with the 36,606 tons consumed in April. Of the total synthetic rubber consumption GR-S amounted to 27,637 tons; neoprene, 2,390 tons; Butyl, 4,799 tons; and nitrile types, 492 tons.

"Cold Rubber" Black Masterbatch Installations

Conversions of facilities in the government-owned GR-S plants to the production of "cold rubber" type polymerized at 41° F. or below is now well on the way to completion, and a production capacity for 200,-000 long tons a year of "cold rubber" is expected to be available well before the end of 1949.

It is understood that consideration is now being given to providing facilities for the production of "cold rubber" in the black masterbatch form in four of the government-owned plants as follows: Borger, Tex., plant operated by U. S. Rubber Co.; Houston, Tex., plant operated by Goodyear; Baytown, Tex., plant operated by General Tire; and Baton Rouge, La., plant operated by the Copolymer Corp. Black masterbatches either with ordinary GR-S or low temperature GR-S help to obtain good black dispersion with a minimum of mixing time and power consumption in the factory. In addition, there are some claims that the tread wear of tires made from "cold rubber" black masterbatches is better than the tread wear of tires made from "cold rubber," but in which the furnace black was mixed in the Banbury. In any event, the aid in mixing and dispersion of the carbon black may warrant the production of a considerable tonnage of "cold rubber" black masterbatch for tire manufacture.

Labor Relations News

Negotiations between Goodrich and the United Rubber Workers, CIO, on a new contract to include wage increases and a company-financed pension plan began in Chicago, Ill., on May 23. A recess was taken over Memorial Day, and the talks were resumed on May 31. On June 15, however, it was announced that the talks had been abandoned since no agreement could be reached between the company and union representatives on the 21 issues presented by the union for the new contract. Strike action is not likely, at least not earlier than August 24, the earliest date that either side can cancel the existing contract.

The company said that it had given the union full information on the downward trend of business and the severe competitive and price situation within the rubber industry. It was also pointed out that declining prices and margins in face of existing high costs call for lower units costs rather than cost increases. The sound way to increase purchasing power in 1949 is to increase the value of the consumer's dollar rather than add to costs and promote more inflation, the company explained.

It was stated further that Goodrich has reviewed its extensive employe benefit programs already in effect, which are the best in the rubber industry and among the best in American industry, and has offered to discuss a broader voluntary contributory sickness and accident program with the union in keeping with present-day needs.

The company indicated that it was willing to resume negotiations with the union any time it was asked to do so.

George R. Bass, president of Goodrich Akron local 5 and spokesman for union negotiators for seven Goodrich plants, charged that the company refused to make a real effort to bargain on the union's wage and pension program. Instead the company insisted that the union accept proposals which would mean wage reductions, he added.

The company could well afford to meet union demands and still make a fair profit, this union spokesman said and indicated that the union would take whatever steps necessary to force the demands in accordance with their agreement with the company and the URW constitution.

Meanwhile Firestone and URW representatives were scheduled to meet on June 24 to set a time and a place to begin their negotiations, and Goodyear and URW representatives have decided to start their talks August 1. It is understood that all of the Big Four companies and the URW will conduct negotiations during August, which will mean a resumption of discussion between the Goodrich and URW representatives and a start of talks between U. S. Rubber and the URW.

H. R. Lloyd, new international URW union president, in a statement in mid-June said that recent tire price cuts would in no way affect the union's stand for higher wages and company-financed pensions. He said company profits are still high and companies can well afford to meet all union demands.

Buckmaster Ouster

Much activity has developed within the URW union as a result of the dismissal by the executive board of the international union of former President L. S. Buckmaster. A minority report by the five executive board members who voted in favor of Buckmaster charged that the former president was not guilty of any of the offenses against the union as presented at his trial. The five dissenting board members stated that they were making their report in order to remove "the curtain of secrecy" so that the rank and file union members might know the truth in this matter.

A 13-page majority decision had been previously sent to all the local URW unions, giving details of the charges against Buckmaster and recording testimony taken at the trial, which lasted 30 days.

The former union president and the new president and his supporters are both carrying on aggressive campaigns among the union members for the showdown on the Buckmaster ouster scheduled for the September URW convention in Toronto.

Promotions at du Pont

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has made six changes in the sales organization of its rayon division. V. Ward Smith, assistant director of sales since 1947, will henceforth concentrate on "Cordura" high-tenacity rayon sales and all indirect sales activities in the division. Ford B. Draper, formerly manager of staple sales, has been named an assistant director of sales to take charge of textile rayon and staple. W. Samuel Carpenter, III, assistant to the director of production, has been appointed assistant manager of "Cordura" high-tenacity rayon sales; while W. W. Owen has been shifted from technical service to "Cordura" sales as special representative. V. S. Van Scoy, assistant manager of the technical service section, is now manager of the new sales development section, with M. A. Kennedy of technical service transferred to the new section.

Ambrose W. Staudt, manager of du Pont's nylon technical service section for the last four years, has been appointed manager of the market research section of the company's trade analysis division, according to Luther D. Reed, director. Mr. Staudt is succeeded by George H. Braniff, assistant manager of the nylon technical service section for the last year.

L. du P. Copeland, a director and secretary of the du Pont company, recently was elected a director of Canadian Industries, Ltd.

EAST

New Martin Sales Engineers

Making an expansion of the firm's marketing activities, appointment of three additional members to the sales staff has been announced by Harold M. Parsekian, director of sales and technical service for the chemicals division, The Glenn L. Martin Co., Baltimore 3, Md.

These new sales engineers, who will undertake territorial assignments in the distribution of the vinyl chloride-type resin, Marvinol VR-10, and other products of the division, are: Frank L. Hemingway, to cover the Chicago area east to Ohio; Arthur W. LaCouture, for Ohio and adjacent points; and C. W. Kleiderer, for the New York Metropolitan Area.

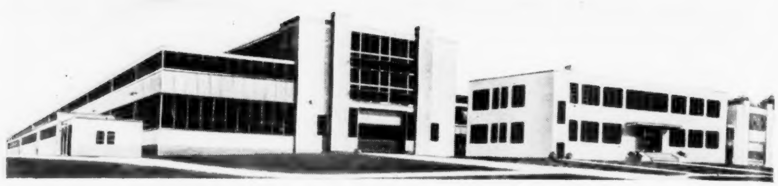
Dr. Kleiderer's commercial career started as plastics chemist with the Sunbeam Electric Mfg. Co. Then he joined the Navy in 1943, taking charge of the plastics division of the "proximity fuze" program. After the war Dr. Kleiderer served as director of research for the Ideal Novelty & Toy Co.

Mr. LaCouture was associated for a time with International Printing Ink Corp., as chemist on Airline-type printing inks. He comes to Martin from Archer Rubber Co., where he specialized in vinyl resin and rubber compounds for the coating of textiles and paper.

Mr. Hemingway served as an officer with the Air Forces during the war. Afterwards he was with Interchemical Corp.'s research laboratories on plastics research and pilot-plant work.

The Martin company, in the June issue of its house organ, *Martin Star*, announced that its Marvinol resin is being used in a new vinyl tile said to be the ideal in flooring with respect to durability, dimensional stability, resiliency, ease of maintenance, chemical resistance, permanence, and beauty of design. Called Sanitile, the new floor covering is an all-vinyl tile of three-ply laminated construction developed by Interchemical Corp. with the cooperation of Boston Woven Hose & Rubber Co. and Martin. The top layer of the tile is a transparent, extremely tough film of pure vinyl which has a soft, satin finish surface that requires no waxing and is impervious to strong soaps, alcohol, grease, and common household chemicals. The intermediate layer provides design and color and is composed of pigmented vinyl decorated in Interchemical's plant at Buchanan, N. Y. The bottom layer is a vinyl-base compound whose function is to provide extra resiliency and recovery from furniture markings. Dimensional stability is achieved by equalizing or cross-balancing the three layers during the welding operation. Sanitile can be laid over wood, plywood, concrete, or almost any other type of base, and installation technique is similar to that for other such flooring. The new flooring is being produced in four original patterns, and five foundation colors are available in each design.

Pennsylvania Rubber Co., Jeannette, Pa., has added a new low-price Standard tire to its line of passenger-car tires. According to R. B. Cave, vice president in charge of sales, the Standard tires will give company distributers a sure-fire winner in the most highly competitive tire buying season to date.



New Home of Elmes Engineering Division in Cincinnati

Elmes Moves to Cincinnati

A move from 230 N. Morgan St., Chicago, Ill., to larger, more modernly equipped quarters in Cincinnati, O., was recently made by the Elmes Engineering Division of American Steel Foundries. All departments of the Division—operations, engineering, manufacturing, sales, and management—are now permanently located at 1150 Tennessee Ave., Cincinnati 29. This new plant, one of the most modern plants in the industry, is well equipped with the latest types of small, medium, and heavy machine tools.

The Elmes organization, founded nearly a century ago, had occupied the plant in Chicago since 1892. The present move was necessitated by the inadequacy at the Chicago location due to ever-growing demand for all types of Elmes hydraulic machinery products, including presses for metal forming and drawing, plastic molding, extrusion, and briquetting, as well as for many special applications; a complete line of high-pressure pumps suitable for working pressures up to 50,000 pounds per square inch; the Elmes air ballasted type of hydraulic accumulators; and high pressure control valves.

Martin Custom Tires Corp., 670 11th Ave., New York 19, N. Y., is marketing its new Martin Nylon-Rayon Squeegee tire which, regardless of mileage and road hazards, is unconditionally guaranteed for three years by the company. Said to be built like no other tire, the new product is claimed to be the safest and most advanced tire in motor car history. The exclusive Martin five-ply and seven-ply custom construction combines a rayon and nylon carcass assembly with the specially designed Martin Safety-Pad. Built of 100% natural rubber, the Safety-Pad hermetically seals the carcass with the integral heat-resisting inner cushion, increasing shock absorption and overall safety. The carcass strength in the tread area of the new tire is stated as being 4,036 pounds. The tire has both a cross-slotted de-skidded tread and an 11-rib squeegee tread, providing both lateral and longitudinal braking safety. Custom-sized beyond the usual "premium" tire standards to maximum wheel allowances, the variable tread radius assures effortless steering and silent running. The tire is of the extra-low-pressure type, using only 22 pounds of air for most cars. Martin Ze-Rub, "cold rubber," is added to the tread for extra mileage, and the white sidewalls of the tire are reinforced with neoprene.

As a companion product, the company is offering its new Martin Custom Built Inner-Guard Tube made of natural rubber. Designed for use in all tires, the tube seals as it rolls and provides protection against blowouts and punctures. Used with the Nylon-Rayon Squeegee tire, the new tube is claimed to give a degree of safety never before attained and to preserve the riding qualities of the extra-low-pressure tires.

Join Wyandotte Firm

Victor H. Vodra and L. A. Jarvis recently entered the sales and the research-development divisions of Wyandotte Chemicals Corp., Wyandotte, Mich. Mr. Vodra is now a special sales representative of Wyandotte Chemicals Michigan Alkali Division. Mr. Jarvis is carrying out compounding and application research in Wyandotte's rubber laboratories. Both men will devote their full time to the application and sales of precipitated calcium carbonates and other specialized chemicals for the rubber industry.

Mr. Vodra first was employed, for five years by the Goodyear Tire and Rubber Co. Following a year as chief chemist and plant superintendent with the Sierra Rubber Co., Mr. Vodra next became Pacific Coast representative for R. T. Vanderbilt Co. During the war he taught an advanced technical course in compounding and processing synthetic rubbers at the University of Southern California. For the past year Mr. Vodra has been operating his own business in Portland, Ore., Northwest Research & Development Co., developing items of rubbers and plastics and selling applications of protective coatings.

Mr. Jarvis spent the past five years in Akron with Firestone Tire & Rubber Co., serving as a technical representative and as a compounder and process chemist.

General Electric Co., Pittsfield, Mass., has announced that an invisible coating of its G-E Dri-Film water repellent has reduced an eight-hour dishwashing chore to a few minutes of rinsing at United States Rubber Co.'s Naugatuck, Conn., laboratories, where production samples of sticky latex are daily drawn off into hundreds of small glass dishes for analysis. Rubber company chemists said that the G-E silicone water repellent is the best material yet found by them to prevent the adherence of latex to glass. Easily applied, No. 9987 Dri-Film is thinned to a 10% solution before being poured into the glass dish. After the excess is drained off, the dish is dried in a circulating air oven for 15 minutes at 200° F. Dishes so treated can be used and cleaned five times before another application is required.

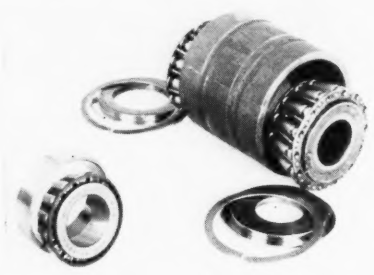
Chardon Rubber Co., Chardon, O., was the subject of a story in the June 15 issue of *Royle Forum*, published by John Royle & Sons, Paterson, N. J. Entitled "The American Way at Work," the story describes the founding of Chardon in January, 1930, by Victor M. Brediger and R. H. Bostwick. Despite the depression, the company prospered by dint of hard work and careful planning and has grown steadily. Now completing its twentieth year of operation, Chardon produces household and mechanical rubber goods in a factory occupying approximately 100,000 square feet of floor space and has recently completed a new office building.

Main Plant of The Timken Roller Bearing Co., Canton, O.

Timken Open House

Timken Roller Bearing Co., Canton 6, O., a major supplier of bearings for rubber processing machinery, celebrated its fiftieth anniversary by staging an open house on June 20 to 24. A special press preview of the celebration was held on June 16, followed by a reception at the Hotel Onesto attended by President William E. Umstattd and other key officials. Timken customers, suppliers, families of employes, and the general public were invited to make an inspection tour of the company's facilities at its Canton and Gambrinus plants to see at first hand the many processes that go into the making of roller bearings and other Timken products. The two plants were converted into a stationary "pageant" that described not only the company's history, but also its industrial and community relations, business policies, and philosophy.

Since its inception 50 years ago Timken has produced some five billion bearings, ranging in weight from two ounces to 9,068 pounds, for use in automobiles, railroad locomotives and cars, steel mills, aircraft, ships, and all types of industrial machinery. The tapered roller bearing was invented by Henry H. Timken, Sr., and placed in production in 1899 by his sons, William R. and Henry H. Timken, Jr., who formed the Timken Roller Bearing Axle Co., St. Louis, Mo. The company moved to Canton in 1902 and has grown steadily to its present position. In addition to the Canton and Gambrinus plants, Timken now operates plants at Wooster, Bucyrus, Columbus, Zanesville, and Mt. Vernon, all in O., Colorado Springs, Colo., and St. Thomas, Ont., Canada. Besides production of roller bearings, the company also manufactures a removable rock bit for use in mining and makes high-grade alloy steel rods, bars, and tubes for its own use and for sale to other industries.



Upper Right: Rear Axle Bearings Used in Dorris Car; *Lower Left:* Modern Timken Bearings, as Used on Rear Axles of Today's Cars

Ross & Roberts Sales Co. has opened new offices and a show room in the Empire State Bldg., 350 Fifth Ave., New York 1, N. Y., under the direction of President Alvin V. Roberts. The company functions as exclusive sales and technical field service representative for Ross & Roberts, Inc., West Haven, Conn., manufacturer of unsupported vinyl film to standard and individual specifications. Arthur M. Ross is president of the parent manufacturing company, of which Mr. Roberts is vice president.

The Manton Gaulin Mfg. Co., Everett, Mass., manufacturer of homogenizers, recently finished construction of a new addition to its factory which adds about 15,000 additional feet of floor space and increases factory capacity to keep pace with increasing sales volume.

Firestone Advances Cohill

Appointment of John L. Cohill as assistant to the president of The Firestone Tire & Rubber Co., Akron, O., was announced last month by President Lee R. Jackson. While with Firestone, Mr. Cohill served in various capacities in Calcutta, India; Buenos Aires, Argentina; Port Elizabeth, South Africa, and as vice president of Firestone International Co. in Akron. During World War II he was manager of the company's Bofors gun plant and later became vice president of Firestone Aircraft Co. He recently was in charge of defense products activities.

Born in Altoona, Pa., Mr. Cohill studied at Carnegie Institute of Technology, England's Royal Military Academy, and Oxford University. He was a captain in the British Army during World War I and shortly thereafter joined the Firestone organization.

John L. Cohill

Tough, durable, all-plastic garden hose, one-third lighter in weight than ordinary rubber hose, is now in production by Firestone Plastics Co., Pottstown, Pa. Made from the company's own high molecular weight vinyl resin, the new Velon garden hose resists oil and grease, sunlight, heat, cold, mildew, and rot, it is claimed. Made in Hunter green color, the hose is streamlined in design, with an inside diameter of ½-inch and an outside diameter of ¾-inch. The hose also has full flow capacity, and the special design of the brass fittings prevents any flow restriction. The new hose, it is further stated, withstands more than 500 hours of exposure to intense artificial sunlight without showing signs of cracking, stiffening, or discoloration, and at 15° F. shows satisfactory resistance to cracking upon sharp flexing and impact. Guaranteed against defects in workmanship and material, Velon garden hose is individually packaged in 25- and 50-foot lengths and is being offered by leading distributers throughout the country.

Taylor Instrument Cos., Rochester, N. Y., has enlarged its sales staff in the Cleveland area with the addition of Benjamin Steverman and Charles Tibbits, as industrial salesmen and John Grotzinger, formerly handling sales and service work in Cleveland but now assigned to field engineering. Mr. Steverman previously had been production manager of the West Lynn plant of General Electric Co. and sales manager for Combustion Controls Corp., Photoswitch, Inc., and J. K. Munhall Co. Mr. Tibbits after the war entered the Taylor production department where he spent four years learning instrument manufacture and application. During recent months he has been doing service work in the Cleveland territory.

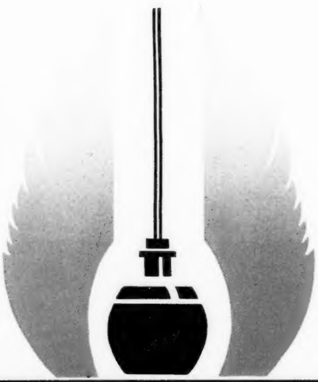
The Rubber Manufacturers Association, 444 Madison Ave., New York, N. Y., has released a display chart containing original equipment tire sizes and the recommended correct inflation pressures for all makes and models of automobiles for the period 1941-1949 inclusive. The chart also contains information on the maintenance of correct inflation pressures in low-pressure tires and emphasizes the importance of accurate air gages. The chart is a continuation of the campaign started last year by tire manufacturers, makers of tire inflation equipment, and tire marketers to improve tire service and promote highway safety by making available accurate information on correct inflation pressures. Tire manufacturers and marketers have purchased quantities of the new display chart for distribution to tire dealers and service stations. A limited surplus from which it can meet requests for small quantities is still available at the Association.

Need faster acceleration?

ULTEX*

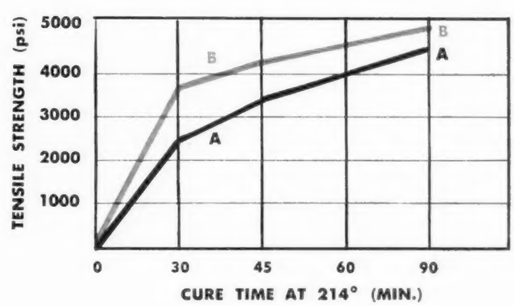
AN ULTRA ACCELERATOR . . .

When looking for fast acceleration consider Ultex, the multiple use accelerator. Rapid and efficient in natural rubber both as a primary and secondary accelerator. Excellent with reclaims and GR-S with safe processing.



TEST RECIPE

COMPOUND	A	B
SMOKED SHEETS	100.0	100.0
ZINC OXIDE	10.0	10.0
SULPHUR	2.0	2.0
STEARIC ACID	1.0	1.0
ULTEX	**0.5**	**0.75**



The C. P. Hall Co.
CHEMICAL MANUFACTURERS

*Manufactured by CHEMICO, INC.
THE C. P. HALL CO., Manufacturers Agents

AKRON, OHIO • LOS ANGELES, CALIFORNIA • CHICAGO, ILLINOIS • SAN FRANCISCO, CALIFORNIA

Architect's Drawing of New Office Building of United Engineering & Foundry

Opens New Office Building

United Engineering & Foundry Co.'s new general office building, at 948 Duquesne Way, Pittsburgh, Pa., was formally opened on June 10 with an open house and buffet for company officials and members of the press. The new building houses from 500 to 600 officers and employes of the company in its executive, legal, sales, engineering, research and development, production, purchasing, traffic, treasury, and industrial relations departments. Manufacturing activities are carried on elsewhere in Pittsburgh and also in Vandergrift and New Castle, Pa., and in Canton, Youngstown, and Akron, O.

Three stories in height, the limestone and granite front of the new building stretches across the entire width of the company's property, about 130 feet. In style and general character the building adheres very much to the functional school of architecture. From the entrance lobby and reception room access to the upper floors is by a stairway and an escalator. The main offices have movable steel partitions so that space may always be divided to meet requirements. The directors' room is on the second floor; while the third floor is occupied largely by an extensive drafting room having a mezzanine blueprint room.

Carbide Research Center

One of the most versatile and up-to-date chemical research centers in the world is being put into operation by Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. The center is located on a 140-acre tract near the company's South Charleston, W. Va., plant. Construction began in March, 1947, and, when finally completed, the center will be the largest single laboratory project ever undertaken by the company.

According to G. O. Curme, Jr., company vice president and vice president-chemicals research for Union Carbide & Carbon Corp., the new establishment is equipped according to the most recently developed requirements for chemical research. Ingenious supports in each laboratory permit complete versatility in the placing of laboratory furniture and equipment, and each laboratory has permanent outlets for 14 separate utilities.

At present only the main research building, devoted to basic research, is being occupied; four large development buildings will be occupied in the future. The completed project will eventually house fundamental organic chemical and resin research as well as process development work. The programs in the new research center will concentrate on the design of new chemical molecules. Research will be directed to the development of new Flexol plasticizers, new synthetic resins, and new organic chemicals for agricultural and other uses.

The laboratory building proper is a three-story T-shaped structure 325 feet long and 96 feet deep. It contains 69 individual laboratories and 48 offices, a large-scale laboratory, a large library, an auditorium seating 125, and necessary storage and service rooms. Now in operation also are a steam plant, a maintenance and equipment fabricating shop, and a cooling tower. Mechanical features of the new laboratory building include a number of novel arrangements and installations, with emphasis on versatility and employe safety.

News from Goodrich

The B. F. Goodrich Co., Akron, O., has appointed Robert L. Baker manager of sales planning of the replacement tire sales division. Previously assistant manager of passenger-car tire sales, and with the company since 1934 except for two years in the Army, Mr. Baker is succeeded in his former post by Charles H. Caldwell, who had joined Goodrich in 1944 and most recently served as advertising and sales promotion manager for shoe products and sundries.

John L. Collyer, Goodrich president, received the honorary Doctor of Laws degree from Ohio State University at its spring commencement exercises, June 10, in recognition of his "outstanding achievement in industry, particularly for his service in connection with the development and production of synthetic rubber during the war."

While in Europe recently as an industry adviser to the State Department in meetings of the International Rubber Study Group, Mr. Collyer had occasion to talk with those administering the European Recovery Program. He was a member of the small non-partisan committee requested by President Truman to recommend the aid that the United States might "wisely and safely" extend to devastated Europe when the recovery program was being formulated.

Howard E. Fritz, vice president-research of the Goodrich company, has been named 1949 winner of the Lamme Medal of Ohio State University. The award is made yearly to a graduate of an Ohio State technical department for "meritorious service in engineering of the technical arts."

Latest of the little publicized, but important new improvements in the automotive field is the use of synthetic adhesive instead of rivets to attach brake linings to brake shoes. Called Plastilock 601, the adhesive was developed by Goodrich and a major automobile company which has been using it on its trucks for the past 18 months and on its 1949-model passenger cars. The adhesive, it is claimed, has greater shear resistance than rivet fastening, withstanding a pull of 11,000 pounds per brake shoe as compared with 5,000 pounds for rivets. In addition, with the adhesive the brake lining can be worn down to the shoe before replacing instead of only about half way as with rivets. The absence of rivets also eliminates the possibility of scoring the brake drum.

The combination of high heat resistance and good oil and abrasion resistance possessed by Goodrich's Hycar rubber has made it an important part of oil-well drilling equipment wherever Black Magic oil base drilling mud is employed. The latter product, made by Oil Base, Inc., is a fluid used for drilling oil and gas wells to increase well production. Lamb Rubber Co. has developed a Hycar compound for use in the drill pipe protector. In addition to flexibility and resistance to Black Magic fluid and water, the protector must possess abrasion resistance since it serves as a bearing or cushion between the rotating pipe and the steel well casing. Lamb Rubber has found that when Hycar is immersed into oils of the Black Magic type, it shows low swell, retains a high percentage of original tensile strength, elongation, and abrasion resistance, and undergoes little change in hardness. The abrasion resistance of Hycar is even more pronounced at elevated temperatures, and in the presence of oil is 35-50% better than equivalent natural

Sketch of Carbide & Carbon's New Research Center, South Charleston, W. Va.

Black Magic in well drilling has increased rubber compounds. The widespread use of the application of Hycar in this field not only for protectors, but also for pump valves, pistons, pipe wipers, rotary hoses, etc.

Special-purpose synthetic rubber with extremely high resistance to chemicals is being used in a new line of industrial footwear made by Hood Rubber Co., division of Goodrich. The special rubber resists not only the destructive actions of acids, greases, fats, and oils, but also cracking or oxidizing under exposure to light and ozone. The rubber has been adapted to a special process to make boots that have no seams or joints. Several different types of the footwear have been tested in chemical and other industries to check on special new features. One such feature is a Geon heel liner whose abrasive resistance gives longer wear; while another is a laceless work shoe whose construction permits instantaneous removal from the foot should a worker spill injurious acids inside the shoe.

Cuts Prices

United States Rubber Co., Rockefeller Center, New York 20, N. Y., has announced reduced wholesale prices for U. S. Carpet Cushion which are intended to make possible retail reductions of approximately 10%. The sponge rubber underlay is widely used under carpets in homes, hotels, theaters, restaurants, stores, public buildings, and institutions. The lower prices, effective July 1, were said to have resulted from more efficient production methods.

The company also announced a reduction of \$10-\$20 in the price of its Koylon foam rubber mattresses, and reduction of \$5-\$10 on matching box springs. The new retail prices follow: three-inch bed size, \$69.50; three-inch full size, \$69.50; and 4½-inch twin and full sizes, \$79.50. Matching box springs are now \$54.50.

Luxury quality at low price is offered by a radically new type of carpet in which weaving is eliminated by cementing the tufts to a heavy cloth backing. Made by Pioneer Carpet Mills Corp., the carpet utilizes a tough but flexible cement, made by U. S. Rubber, which gives it the same feel and handling qualities as conventional woven carpets. In addition to economy, other advantages claimed for the new carpet are: pile is anchored securely and will not pull out even during vigorous cleaning; all of the wool is on top of the backing and available for wear; carpet is ravel-proof, fray-proof, can be cut in any direction, and can be seamed like linoleum; the carpet does not require stretching during laying and will lie flat at all times; adhesive layer keeps dirt from penetrating the backing; and the carpet can be made much faster than conventional types.

The first completely washable wool-lined children's snowsuits will be available this fall as the result of a cooperative development announced by Dyersburg & Morgan Fabrics and U. S. Rubber. The development is made possible by a special wool lining material treated with the rubber company's Koloc shrink control agent. The textile company has already started production of the washable liner fabric and expects to turn out close to a million yards this year, providing material for more than a million suits. The liner will be used primarily in suits made from synthetic fibers which are themselves shrink resistant. A knitted-type "interlock" construction is said to give the liner fabric stretchability and freedom from binding.

Personnel Changes

Donald L. McCollum has been made plant manager of the synthetic rubber plant operated by U. S. Rubber in Naugatuck, Conn. Mr. McCollum joined the company in 1919 at its footwear plant in Mishawaka, Ind., transferred to the Naugatuck Chemical division in 1926, and became superintendent of reclaimed rubber production in 1931. Early in World War II he was appointed production superintendent of Pennsylvania Ordnance Works, Williamsport, Pa., which U. S. Rubber operated for the government. Later he became assistant factory manager of the synthetic rubber plant in Institute, W. Va.; in 1945, factory manager at Naugatuck Chemical, and in January, 1948, manager of reclaimed rubber at Naugatuck Chemical.

Appointment of F. M. Urban as sales manager of engineered rubber products and H. Leon Moran as factory manager, Fort Wayne, Ind., plant, was announced June 10.

Mr. Urban joined the company in 1929 as a salesman at Chicago. Specializing in industrial rubber products, he progressed through various sales positions until 1935, when he was named assistant district sales manager in the Chicago office. Four years later he was made assistant sales manager for all branch sales in the company's mechanical goods division and in 1946, merchandise manager for the division.

Mr. Moran joined U. S. Rubber in 1922 as a laboratory assistant in the Cleveland plant and progressed through various production positions until 1939, when he was made a divisional superintendent at the Passaic, N. J., plant. In 1945 he became general superintendent of that plant and in 1946, manager of engineered rubber products at the newly acquired Fort Wayne plant.

This plant manufactures specialized non-tire rubber products for the automotive industry such as steering wheels, accelerator pedals, clutch plates, and other rubber-to-metal parts; many specialized rubber-to-metal parts used for the elimination of shock, vibration, wear, and noise by the petroleum, farm equipment, railroad, and other heavy industries; and industrial grinding wheels and rubber-lined tanks for various industrial and chemical services.

Mr. Urban will supervise sales for all these products; while Mr. Moran will be in charge of plant operation.

Gerritt Weston has been appointed sales promotion manager of the general products division, replacing Robert D. Stuart, resigned. Mr. Weston first joined U. S. Rubber in 1920, but left in 1923 to enter the outdoor advertising field. He rejoined the rubber company in 1935, however, and has been engaged in various advertising and promotional capacities in the company's general products and tire divisions. In his new position he will supervise advertising, displays, and dealer promotions for the company's golf balls, druggists' sundries, soles and heels, sponge rubber products, and water wear.

The Premier Rubber Mfg. Co., Dayton, O., has made the following changes in management necessitated by the death of its president, Joseph F. Westendorf. To succeed his brother, John Westendorf was elected president. Louis R. Jacobs was chosen general manager, and Joseph L. Leibold, secretary.

Seiberling Rubber Co., Akron, O., has named as Boston district manager George W. Staples, former New York district manager and recently a special sales representative for the company. Mr. Staples replaces L. E. Kersey, transferred to Akron to work on special assignments from the sales manager's office. Mr. Kersey, formerly a salesman in the New York district, has been in charge of the Boston district since 1944.

Improves Pliolite S Process

An improved manufacturing process resulting in a new form of Pliolite S-5 for paint manufacturers at a substantial reduction in price was announced by Goodyear Tire & Rubber Co., Akron, O. Offered July 1 in a new porous pellet form, Pliolite S-5, a high styrene copolymer used in enamels and other coatings, has the desirable solubility characteristics of a powdered resin without the disadvantages of dusting during handling or "floating" during dissolution. Price reductions amount to 5¢ a pound on the familiar milled resin and 10¢ a pound on the new unmilled form, making the price of milled resin 54¢ a pound in carload lots of 36,000 pounds or more, and unmilled resin 49¢ a pound for similar quantities. Proportionate reductions were also announced in the Pliolite S-5 bases, which are dispersions of various pigments in the resin.

The outstanding contributions of an American industrialist to the economic development and welfare of Brazil was recognized on June 17 at Rio de Janeiro with the presentation to P. W. Litchfield, Goodyear chairman, of the highest Brazilian honor conferable upon a foreigner, the Order of the Cruzeiro do Sul (Southern Cross). Mr. Litchfield and several other executives left for South America on June 5 on an inspection tour of Goodyear's South American plants. One of these is a factory at Sao Paulo, Brazil, which has done much to further that country's economic progress. Goodyear also has offices and a distribution center at Rio de Janeiro. In addition, the inspection party will also visit the company's plants in Peru and Argentina.

Tangible evidence that Goodyear's plantations in the Far East are rapidly resuming normal operations was seen in the recent arrival here of 225 tons of crude rubber received from the company's Dolok Merangir Estates in Sumatra, the first shipment from that source since the start of the war. Dolok Merangir was one of the company's larger rubber growing operations prior to the war and was seized by the Japanese early in 1942. Rubber production there was resumed in 1947 under a Dutch appointed custodian, and the plantation was formally repossessed by Goodyear on December 30, 1948. According to J. J. Blandin, vice president of Goodyear Rubber Plantations Co. and manager of the crude rubber division, a large portion of Dolok Merangir's output will consist of special types of rubber prepared for processing into special manufactured products. Mr. Blandin also revealed that another of the company's prewar Sumatra holdings, the Wingfoot plantation, was recently placed in limited operation under the supervision of an Indonesian Government-appointed custodian. A Goodyear survey party is in Sumatra ready to make a complete survey of this plantation and report on its present condition.

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NEWS ABOUT PEOPLE

William B. Bell, since 1922 president of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., on June 13 received the honorary degree of Doctor of Science from the Philadelphia College of Pharmacy & Science—in recognition of his services in the field of public health and in the stimulation of pharmaceutical research.

Lorin B. Sebrell has resigned as director of research and chemical products development at Goodyear Tire & Rubber Co., Akron, O. Dr. Sebrell, who had been with the company continuously since 1922 and as research director for the past 21 years, has as yet not announced his plans for the future aside from the fact that he is taking first a much-needed vacation. Dr. Sebrell is widely known for his research and development work in the field of natural rubber chemistry, particularly accelerators, and in synthetic rubber, plastics, and organic chemistry.

Frederick F. Hollowbush recently was made comptroller of Seamless Rubber Co., New Haven, Conn. He has been with the company's statistical department since 1923.

Cyril W. Notley has been promoted to passenger tires sales manager of the Richmond branch, The General Tire & Rubber Co., Akron, O. He was formerly a territory salesman with home offices in Norfolk, Va., and had joined General Tire in 1947.

W. E. Bittner has been elected vice president-purchases of Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, O. He joined the company in 1916 and three years later was transferred to the purchasing department as a buyer; he subsequently became assisting purchasing agent, purchasing agent, and then director of purchases eight years ago.

A. D. Ross Fraser, president of Rome Cable Corp., Rome, N. Y., was a principal speaker at the thirtieth international costs conference of the National Association of Costs Accountants, held last month in Chicago, Ill.

Gustav Egloff, petroleum technologist and director of research for the Universal Oil Products Co., Chicago, Ill., recently was elected president of the Western Society of Engineers,, 84 E. Randolph St., Chicago 1, which on May 25 marked its eightieth anniversary.

Arthur L. Metzger has been made sales manager of A. Bamberger Corp., 44 Hewes St., Brooklyn, N. Y., in charge of sales of the elastomeric division, handling polyvinyl chloride, polyethylene and other related materials. This appointment is in line with Bamberger's expansion program and the taking on of additional personnel to facilitate handling and servicing the increasing number of customer accounts. Mr. Metzger was formerly sales manager of the plastics division of Meyer & Brown.

John J. Littley

John J. Littley has been appointed sales engineer for hydraulic presses and power tools, assigned to the Chicago district office of The Baldwin Locomotive Works, Philadelphia 42, Pa. After one year in the engineering department of SKF Industries, Mr. Littley entered the United States Army and after his discharge in 1946 joined the Baldwin organization, serving in various engineering and sales capacities, connected with the hydraulic press and power tool department.

E. B. Osborne has been made sales representative for Geon plastic materials for B. F. Goodrich Chemical Co., Rose Bldg., Cleveland, O. His territory will include Philadelphia and adjacent area in addition to certain sections of Delaware and Maryland. A graduate of Illinois College with a B.A. in chemistry and with an M.S. in chemistry from the University of Wisconsin, Mr. Osborne joined The B. F. Goodrich Co. in 1943 and for the past six years was engaged in research and technical service work.

Allan F. Hardy, Jr., has been made a director and plants engineer of the Norton Co., Worcester, Mass., to replace Clarence W. Daniels, who retired after 36 years with the company.

Warren M. Pike has been appointed New England representative for Farrel-Birmingham Co., Inc., Ansonia, Conn. With offices at 247 Franklin St. Boston 10, Mass., Mr Pike will handle the sale of gears and gear units made at the company's Buffalo, N. Y., plant. He entered the sales engineering field in New England in 1933 and was a partner in Arthur Pike Co. prior to joining the Army in 1940. He returned to sales engineering in 1946.

George W. Russell, assistant sales manager of American Cyanamid Co.'s industrial chemicals division, Rockefeller Center, New York 20, N. Y., was elected president of the Chemical Market Research Association at its annual business meeting, Hotel Biltmore, New York, June 9.

Wallace W. De Laney has been appointed trustee of The Norwalk Tire & Rubber Co., Norwalk, Conn., under the Federal Bankruptcy Act, Chapter 10, for reorganization. Mr. De Laney, who lately has been acting as a consultant for the rubber industry, had resigned in December, 1948, as chairman, president, and a director of the Faultless Rubber Co., posts he had accepted in 1941. He had been, at that time, vice president and factory manager of Seamless Rubber Co.

Virginia MacAuley is the new advertising manager of I. B. Kleinert Rubber Co., 485 Fifth Ave., New York 17, N. Y., succeeding Caroline W. Kreuttner, resigned. Miss MacAuley has been handling publicity at Kleinert's for the last year and prior to that time had been with United States Rubber Co.

C. C. Thackray, president, Dominion Rubber Co., Montreal, P. Q., recently was elected as president also of Irwin Dyestuff Corp., Ltd., Montreal, to succeed the late John Irwin.

WEST

Wright Mfg. Co., Houston 5, Tex., is mailing out samples of Wright Rubber Tile flooring on request from potential consumers with the conviction that the tile itself is its own best salesman, according to President Thomas F. Millane. Tile samples are available in any of the colors made, and an advertising campaign in national magazines is being conducted to acquaint the public with this service.

"When a possible buyer gets that sample, he can see the brilliant surface achieved by our advanced compounding and unusually high curing pressures, feel the smooth, resilient surface, and perform any test on the tile he desires," Mr. Millane said.

Before the sample distribution plan went into operation, a check was made on housewife reaction with excellent results.

The color possibilities offered by Wright Rubber Tile flooring are explained and presented graphically in four colors in a new eight-page folder available from the company. The tile is made in two types: Wrightex, a soft surface tile for silence and resiliency; and Wrightflor, a hard surface tile for heavy wear and low maintenance cost.

Monsanto Chemical Co., St. Louis 4, Mo., announced that an improved crystalline calcium nitrate is now available at the lowest price since before the war. The finer size of the crystals is an important factor in use of the material as a latex coagulant since it permits the crystals to dissolve faster while retaining the high purity and low water content quality desirable for proper coagulation. According to H. J. Heffernan, general sales manager of the company's Merrimac Division, the price of the new calcium nitrate crystals has been reduced 50% on orders of 20,000 pounds or more, and corresponding reductions have been made on smaller quantities. The new product is also available in alcoholic solution at reduced prices.

Marbon Corp., 1926 W. 10th Ave., Gary, Ind., has appointed C. R. Holt as technical service manager and H. H. Irvin chief chemist. Mr. Holt joined the Marbon laboratories in 1947 as a rubber chemist and prior to that had been assistant chief chemist of footwear at the Mishawaka plant of United States Rubber Co.

Mr. Irvin joined Marbon as chemical engineer in 1943 and since then has worked in the research laboratory. Prior to his association with Marbon he had been in the metallurgical department of Inland Steel Co.

Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., has moved the following offices into larger quarters. The Cleveland office, headed by Paul V. Wheeler, district manager, is now at 314 Hanna Bldg., Cleveland 15. The Baltimore office, of which Charles C. Wiley is district manager, has moved to 2315 St. Paul St., Baltimore 18; while the office in Huntington, W. Va., headed by David W. Stevens, is now at 1009 Fifth Ave., Huntington 1.

CANADA

RAC Meeting and Election

A warning against the dumping of United States rubber goods on the Canadian market was given by C. C. Thackray, president of Dominion Rubber Co., Ltd., and of the Rubber Association of Canada. Speaking at the Association's annual meeting on May 21 at Montreal, P.Q., Mr. Thackray declared that Canadian industry would have to maintain a vigilant outlook as competition with the United States becomes more and more severe. Surveying the Canadian sales picture, the speaker stated that a downward trend may be expected next year and that the 10-year seller's market may be considered finished. He advised the industry to face the future confident that it will surmount the selling problems of the coming year as successfully as it had overcome the troubles of the past.

A report from the Association's defense preparedness committee on rubber, given at the meeting, advocated the stockpiling of at least 40,000 tons of natural rubber.

The meeting concluded with the election of officers, as follows: president, Mr. Thackray; vice president, M. L. Brown, Seiberling Rubber Co. of Canada, Ltd.; and treasurer, R. C. Berkinshaw, Goodyear Tire & Rubber Co. of Canada, Ltd. Other directors elected, in addition to the officers, were: J. R. Belton, Gutta Percha & Rubber, Ltd.; W. H. Funston, Jr., Firestone Tire & Rubber Co. of Canada, Ltd.; John W. Miner, Miner Rubber Co., Ltd.; J. D. Morgan, Viceroy Mfg. Co., Ltd.; A. G. Partridge, also of Goodyear; G. W. Sawin, B. F. Goodrich Rubber Co. of Canada, Ltd.; and J. I. Simpson, Dunlop Tire & Rubber Goods Co., Ltd.

Polymer Corp., Sarnia, Ont., at its annual meeting last month elected two new members to the board, Frank Sherman and C. A. Massey, to succeed H. J. Carmichael and L. C. McCloskey, who retired after serving three years as directors.

OBITUARY

John W. Whitehead

AFTER an illness of several weeks John William Whitehead, since 1927 president and chairman of the board of The Norwalk Tire & Rubber Co., Norwalk, Conn., died May 27 in the Norwalk Hospital. The rubber company executive, who was born in Albany, West Australia, on July 6, 1884, had been suffering from a heart condition.

Mr. Whitehead was one of the founders of Norwalk Tire & Rubber in 1914. Prior to that time, after he became interested in the rubber industry following a trip to the Malay Straits before coming to America, he had been associated with the Western Electric Co., San Francisco, Calif., from 1905 to 1907. That year he joined the Diamond Rubber Co., San Francisco, as a salesman and soon was made assistant Pacific Coast manager. When Norwalk was organized in 1914, he began work in the company's accounting department. In 1916 he was transferred to the sales department and in 1918 was made assistant sales manager. Then in 1923 the deceased was promoted to the managership of Atlantic Coast sales and in 1926 was named general sales manager.

A Mason, Mr. Whitehead was a past master of St. John's Lodge F&AM. He was also a director of the Norwalk Savings Society and the Norwalk General Hospital and a member of the State Council of the American Mutual Liability Co., the New York Athletic, the Longshore Beach & Country, the Shore & Country, and the Algonquin clubs.

Masonic services were held May 29 at the Collins' Funeral Home, Norwalk, and funeral services were held May 30 at the First Congregational Church on the Green, followed by interment in Riverside Cemetery.

The deceased is survived by his wife, a brother, and a sister.

Christopher Roberts

THE vice president and son of the founder of the Weldon Roberts Rubber Co., Newark, N. J., Christopher Roberts, died on May 27 at Vevey, Switzerland, where he had resided since 1947. Death was caused by a heart attack.

Born in Newark, N. J., April 20, 1897, Mr. Roberts was graduated from Haverford in 1921 with a B.S. degree. He received his M.A. from Harvard in 1922 and his Ph.D in 1927. From 1922 to 1924 he was an assistant in economics at Harvard and in 1925 became an instructor of economics there, a position he retained until 1929, when he became an assistant professor of economics at Duke University. In 1935 he left Duke and returned to Harvard as a lecturer on economics for two years. During World War II he served with the Bureau of Census in 1942 and with the Office of Lend-Lease Administration from 1943 to 1946. In 1946 and 1947 he was Economic Advisor to the O.M.G. in Berlin. Just before going to Europe in 1946 he organized the New York Bureau of Statistics office.

Mr. Roberts had served with the American Red Cross in the first World War with the rank of captain. He was also a member of Phi Beta Kappa.

The deceased is survived by his brother, Garrett Roberts, head of Weldon Roberts.

Joseph F. Westendorf

JOSEPH F. WESTENDORF, president of the Premier Rubber Mfg. Co. and the Dayton Casting Co., both of Dayton, O., died on June 6 at his home in Dayton. He was born in that city in 1869.

A graduate of the Holy Trinity parochial school, Mr. Westendorf later attended the A. D. Wilt Commercial College. His first job was as a wheelmaker with the S. N. Brown Co., after which he was associated with the Martin Schneble Sons Co., and the Martin Stengle Furniture Co., all of Dayton. He then joined the Sterling Motor Co., of which he became secretary-treasurer. In 1909 he founded the Dayton Casting Co. and in 1922 he was co-founder, with his brother, of the Premier Rubber Mfg. Co. He was also a director of the Dayton Metal Products Co.

Mr. Westendorf was a member of the Holy Trinity Catholic Church, the Father Kuhlman General Assembly, the Knights of Columbus, the Catholic Order of Foresters, St. Michael Court, the Knights of St. John Commandery, No. 104, the St. Joseph's Orphan Society, the St. Joseph's Institute, the Rotary and the Engineers clubs, the American Foundry Society, and the Y.M.C.A.

Funeral services for the deceased were on June 10. Requiem High Mass was sung at Holy Trinity Church, followed by burial at Calvary Cemetery in Dayton.

Surviving are the widow and two brothers.

Henry W. Kimmel

HENRY W. KIMMEL, vice president and secretary of Taylor Instrument Cos., Rochester, N. Y., died on May 26 in Rochester. Funeral services were held on May 31 in that city, followed by burial.

Born in Rochester, October 19, 1876, Mr. Kimmel was a graduate of the Rochester Business Institute. He joined Taylor in 1896 as a bookkeeper and remained in that position until 1900 when he was made secretary. In 1913 he became office manager and in 1919 a director. Then in 1934 he was named vice president of Taylor Instrument Cos. and president and treasurer of Taylor Instrument Cos. of Canada, Ltd. He retained all the positions, except that of bookkeeper, at the time of his death.

Mr. Kimmel was also a director of Utica Mutual Insurance Co. and a trustee of Community Savings Bank in Rochester.

Surviving are the widow, two daughters, and five grandchildren.

William F. Bass

DEATH has claimed another veteran of the rubber industry. William F. Bass, who died at his home in Westfield, N. J., on May 27, was buried May 31 in Hillside Cemetery, Plainfield, N. J., after services at his late residence.

Mr. Bass first was employed by the brokerage house of W. R. Grace Co. in New York, N. Y., where he remained 13 years. He next spent a year with the firm of A. T. Morse and in 1895 was hired by the Crude Rubber Co. After nine years he joined the crude rubber department of United States Rubber Co., also in New York. In 1908, Mr. Bass became vice president and general manager of the rubber company's subsidiary, General Rubber Co., which position he held at the time of his retirement in July, 1926.

The deceased was born in Charlotte County, Va., on September 4, 1860. But when he was a youngster, the family moved to Plainfield, where he attended grade and high schools.

Mr. Bass belonged to the Masons, the old Rubber Association of America, the old Crescent Athletic Club of Brooklyn, the Princeton Club of New York, and the North Fork, the Echo Lake, and the Shackamaxon country clubs.

He is survived by his wife, a son, a daughter, a sister, seven grandchildren, and seven great-grandchildren.

Alexander C. Nixon

ALEXANDER C. NIXON, a superintendent at the engineering laboratory of the Fisher Body Division of General Motors Corp., Detroit, Mich., passed away May 25 at a Detroit hospital. Before joining GM he had served as a chemist at the Ford Motor Co.

Mr. Nixon was born in New York, N. Y., 55 years ago. He was a graduate of Tufts College and a member of Delta Upsilon, First Presbyterian Church, and the executive committee of the Detroit Rubber & Plastics Group, Inc.

He leaves his wife, two sons, two sisters, and three brothers.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$1.75 q.	June 30	June 21
American Wringer Co., Inc.	Com.	0.15 red.	July 1	June 15
Armstrong Rubber Co	"A & B"	0.25	July 1	June 17
	Pfd.	0.59¾ q.	July 1	June 17
Borg-Warner Corp	Com.	1.00 q.	July 1	June 15
	Pfd.	0.87½ q.	July 1	June 15
Crown Cork & Seal, Ltd.	Com.	0.50 q.	Aug. 15	July 15
Denman Tire & Rubber Co	Pfd.	0.12½ q.	July 1	June 20
Dunlop Tire & Rubber Goods Co., Ltd.	5% Cum. 1st Pfd.	2½% s.	June 30	June 15
	Pfd.	0.62½ s.	June 30	June 15
Electric Storage Battery Co	Com.	0.50 red.	June 30	June 13
Faultless Rubber Co	Com.	0.75 irreg.	June 25	June 15
Garlock Packing Co.	Com.	0.25 q.	June 30	June 17
General Cable Corp	1st Pfd.	1.00 q.	July 1	June 14
	2nd Pfd.	0.50 q.	July 1	June 14
General Tire & Rubber Co.	4½% Pfd.	1.06¼ q.	June 30	June 20
	3¾% Pfd.	0.93¾ q.	June 30	June 20
	3¼% Pfd.	0.81¼ q.	June 30	June 20
Goodyear Tire & Rubber Co	Com.	1.00 q.	July 2	June 10
Jenkins Bros	N-V Com.	0.25	June 30	June 17
	Fdrs. Com.	1.00	June 30	June 17
	Pfd.	1.75	June 30	June 17
Johns Manville Corp.	Pfd.	0.87½	Aug. 1	July 11
Kendall Co	Com.	0.25 q.	June 1	May 24
	Pfd.	1.12½ q.	July 1	June 16
Mansfield Tire & Rubber Co	Com.	0.25 q.	June 20	June 10
	Pfd.	0.30 q.	July 1	June 16
Midwest Rubber Reclaiming Co.	4½ Pfd.	0.56¼ q.	July 1	June 14
Monroe Auto Equipment Co.	Com.	0.30 incr.	June 15	June 1
Rome Cable Corp	Com.	0.15	July 1	June 13
	4% Cum. Conv. Pfd.	0.30	July 1	June 13
Russell Mfg. Co.	Com.	0.37½	June 15	May 31
Seiberling Rubber Co	4½% Pfd.	1.12½ q.	July 1	June 15
	Pfd. "A"	1.25 q.	July 1	June 15
Thermoid Co.	Pfd.	0.62½ q.	Aug. 1	June 20
Union Asbestos & Rubber Co	Com.	0.25 q.	Oct. 3	Sept. 10

FINANCIAL

Flintkote Co., New York, N. Y., and subsidiaries. Twelve weeks to March 26: net income, $725,871, equal to 51¢ each on 1,257,935 common shares, compared with $1,560,708, or $1.24 each on 1,186,421 shares, in the corresponding period of 1948; net sales, $12,837,288, against $17,541,370.

General Motors Corp., New York, N. Y. March quarter: net income, $136,763,338, equal to $3.04 a common share, contrasted with $96,481,412, or $2.12 a share, in the corresponding period last year; net sales, $1,282,324,474, against $1,089,151,693.

Hewitt-Robins, Inc., Buffalo, N. Y., and subsidiaries. Quarter ended March 31: net profit, $219,805, equal to 79¢ each on 278,714 capital shares, contrasted net loss of $108,902 in the '48 period; net sales, $5,333,619.

Johns-Manville Corp., New York, N. Y., and subsidiaries. Three months to March 31: net profit, $2,883,431, equal to 97¢ each on 2,906,062 common shares, compared with $2,253,052, or 77¢ each on 2,905,810 shares, in the 1948 period; net sales, $38,022,710, against $37,525,400; reserve for taxes, $2,173,005, against $2,253,733.

Koppers Co., Inc., Pittsburgh, Pa. Quarter ended March 31: net income, $1,813,131, equal to $1.09 each on 1,525,825 common shares, against $1,577,165, or $1.27 each on 1,125,825 shares, in the like period last year; net sales, $49,126,142, against $42,452,053.

Johnson & Johnson, New Brunswick, N. J., and subsidiaries. First quarter, 1949: net income, $2,437,774, equal to $1.24 a common share, against $3,228,007, or $1.71 a share, in the 1948 quarter; net sales, $35,333,450, against $35,626,327.

Link-Belt Co., Chicago, Ill., and subsidiaries. Three months to March 31: net income, $2,031,250, equal to $2.49 each on 816,778 capital shares, compared with $2,349,709, or $2.91 each on 807,930 shares, in the first quarter last year; net sales, $24,109,277, against $25,872,660.

Monroe Auto Equipment Co., Monroe, Mich. Nine months to March 31: net income, $749,022, equal to $1.90 a common share, against $417,670, or 91¢ a share, a year earlier; net sales, $13,529,730, against $9,426,949.

National Automotive Fibres, Inc., Trenton, N. J., and wholly owned subsidiaries. Quarter ended March 31; net profit, $848,405, equal to 89¢ each on 953,779 capital shares, against $559,288, or 59¢ a share, in the like period last year; federal taxes, $547,548, against $372,411.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. March quarter: net profit, $12,713,254, equal to $2.10 each on 6,047,000 shares outstanding, contrasted with $18,154,148, or $3.00 each on 6,045,106 shares, in the corresponding period of 1948; provision for federal income taxes, $4,610,200, against $6,508,200.

Rome Cable Corp., Rome, N. Y. Year ended March 31, 1949: net earnings, $1,115,960, equal to $2.98 a common share, compared with $1,152,579, or $2.83 a share, in the preceding fiscal year; net sales, $26,088,523, a new high, against $25,202,853; working capital, $5,639,491, against $3,946,520.

Minnesota Mining & Mfg. Co., St. Paul, Minn. Three months to March 31: net income, $3,215,250, equal to $1.58 each on 1,972,845 common shares, contrasted with $2,817,049, or $1.39 a share, in the 1948 quarter; net sales, $26,835,369, against $24,742,482.

New Jersey Zinc Co., New York, N. Y. Quarter ended March 31: consolidated net profit, $2,760,184, equal to $1.41 each on 1,960,000 capital shares, against $1,824,908, or 93¢ a share, a year earlier.

Pharis Tire & Rubber Co., Newark, O. For 1948: net loss, $892,508, compared with a net income of $358,874, or 85¢ a common share, in 1947; net sales, $8,801,321, against $19,280,272.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. First three months, 1949: net profit, $473,191, equal to 75¢ a share, against $570,379, or 91¢ a share, a year earlier.

Skelly Oil Co., Kansas City, Mo. Three months to March 31: consolidated net income, $7,783,921, equal to $6.55 each on 1,187,424 common shares, against $8,960,029, or $9.13 each on 981,342 shares, in the 1948 period.

United Carbon Co., Charleston, W. Va., and subsidiaries. Quarter ended March 31: net income, $726,597, equal to 91¢ each on 795,770 capital shares, compared with $804,068, or $1.01 a share, in the corresponding period last year; reserve for depreciation and depletion, $797,761 against $895,454; income taxes, $317,000, against $614,000.

United States Rubber Co., New York, N. Y. First quarter: net earnings, $3,375,069, equal to $1.18 a share, against $4,601,164, or $1.87 a share, in the quarter ended March 31, 1948; consolidated net sales, $121,510,511, against $130,536,932.

Patents and Trade Marks

APPLICATION

United States

2,468,724. **Wrinkle Flexible Material with Rubber Solution Coating.** N. T. Beynon, Dayton, O., assignor to New Wrinkle Inc., Wilmington, Del.

2,468,845. **Body of Plastic Material Molded around and Completely Enclosing All Parts of a Rectifier Unit Except the Projecting Ends of Terminal Conductors.** L. E. Thompson, London, England, assignor, by mesne assignments, to Union Switch & Signal Co., Swissvale, Pa.

2,468,900. **Mount for a Radial Engine Including Annularly Disposed Cushioning Elements for Absorbing Oscillatory Engine Motion about the Axis of the Engine.** L. F. Thiry, Montclair, N. J., assignor to General Tire & Rubber Co., Akron, O.

2,468,901. **Cushioning and Vibration Damping Support.** L. F. Thiry, Montclair, N. J., assignor to General Tire & Rubber Co., Akron.

2,468,908. **Resilient Member Suitable for Employment as the Cloth-Engaging Part of a Loom Temple Roller, Formed of Matted Fibers Partially Impregnated with a Flexible Film-Forming Material.** T. C. Woodman, London, England, assignor, by mesne assignments, to Celanese Corp. of America, a corporation of Del.

2,468,924. **Pressure-Tight Seal between a Tube and a Tube Sheet Having Facing Annular Grooves and with an Annulus of Rubber-Like Material Fitting Tightly there-between and into the Grooves.** E. W. Courtier, assignor to Swenson Evaporator Co., both of Harvey, Ill.

2,468,937. **Headgear Including a Relatively Wide, Freely Stretchable Resilient Band Member.** E. McCaffrey, Jamaica, N. Y.

2,468,949. **In a Massage Vibrator, a Soft Resilient Pad.** L. H. Snyder, Chicago, Ill., assignor, by mesne assignments, to Knapp-Monarch Co., St. Louis, Mo.

2,468,957. **Resilient Mounting for Tractor Track Idlers.** G. E. Burks, Peoria, Ill., assignor to Caterpillar Tractor Co., San Leandro, Calif.

2,468,980. **Piston Sealing Structure Including at Least Two Metallic Snap Rings and a Continuous Rubber-Like Sealing Ring Underlying These Rings.** M. W. Huber, Watertown, N. Y., assignor to New York Air Brake Co., a corporation of N. J.

2,468,985. **Resilient Connection.** A. S. Krotz, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,469,060. **In a Mop Head, Including an Elongated Block of Absorbent Sponge Material, a Backing Strip of Flexible Rubber Secured to and Covering the Top Face of the Block and Extending beyond the Edge thereof to Form a Flexible, Straight-Line Squeegee.** P. S. and T. S. Vosbikian, both of Melrose, Pa.

2,469,099. **Silicone Resin Coating on Stranded Leads Secured to a Winding on a Stator Core.** O. E. Andrus, Altadena, Calif., assignor to A. O. Smith Corp., Milwaukee, Wis.

2,469,131. **Inflatable Door Sealing System.** W. G. Ross, Berkley, assignor to Chrysler Corp., Highland Park, both in Mich.

2,469,268. **Insert of Compressible, Resilient Material for a Bowling Ball.** C. W. Jerome, Detroit, Mich.

2,469,292. **For Retaining a Drinking Tube within a Glass, a Device Including an Elastic Ring-Shaped Member Compressible about the Body of the Glass.** C. B. Cornwell, Belmont, Calif.

2,469,300. **In an Inner Tube for a Pneumatic Tire, a Continuous Web Which Divides the Tube into Two Complementary Sections and Is Forced against the Inner Surface of a Section Deflated by Puncture or Rupture.** W. J. Heyneman, Portsmouth, Va.

2,469,394. **Cushioned Tire.** H. C. Lord, Erie, Pa.

2,469,416. **Polyisobutylene Bond for Cellulose Sheet Insulating Material on a Copper Conductor.** W. H. Smyers, Westfield, N. J., assignor, by mesne assignments, to Jasco, Inc., a corporation of La.

2,469,474. **In an Electrically Conductive Gasket, Including an Elongated Core Including a Strip of Metal, a Covering of Rubber-Like Material Surrounding the Strip.** D. D. Perry, Bainbridge, assignor to Bendix Aviation Corp., New York, both in N. Y.

2,469,489. **Baby's Nurser with Nipple and a Resilient Hollow Dome Member.** G. Allen and R. Dahl, both of Fairview, Mont.

2,469,556. **Child's Sleeping Suit Including a Moistureproof Insert.** I. W. Jacobson, St. Louis Park, Minn.

2,469,586. **For Cleaning a Concave Cylindrical Surface, a Tool Including a Cylindrical Member Having an External Abrading Surface and Formed of Elastic Resilient Material.** R. C. Wallace, Pawtucket, R. I.

2,469,596. **Core of Sponge Rubber in a Compression Spring.** P. G. Groom, Hamilton, Ont., Canada.

2,469,700. **Transparent Protective Garment for Infants.** E. S. Petrucelli, Kirkland, Wash.

2,469,793. **Figure-Free Maternity Suspender.** S. A. Siegel, Chicago, Ill.

2,469,863. **Waterproof Stocking Protector.** J. McK. Conley, Cleveland, O.

2,469,962. **Pneumatic Suspension Means for Vehicles.** R. Gouirand, New York, N. Y.

2,469,969. **Impact Absorbing Overshoe of Elastic Material Including in Its Lower Portion a Plate Member, a Rubber Pad, and an Inflatable Member around the Pad.** C. T. Lee, Cleveland, O.

2,470,185. **Vibration Isolator Including Upper and Lower Cylindrical Rubber Elements.** E. Pietz, assignor to L. N. Barry, G. W. Foss, and E. Pietz, doing business as L. N. Barry Co., all of Cambridge, Mass.

2,470,398. **Inflatable Pads Secured to a Therapeutic Mattress.** F. Hayes, Los Angeles, Calif.

2,470,593. **Cooking Implement Having a Cooking Surface Consisting of a Thin Coating of a Hardened, High Molecular Weight Alkylated Siloxy Composition.** P. S. Webb and J. R. Koster, both of Boulder City, Nev., assignors to Processed Surfaces Inc., New York, N. Y.

2,470,599. **A Long Draft Apron for Fiber Drawing Including a Tubular Body of Twine Wear-Resistant Layers of Synthetic Rubber in the Interior and on the Surface of Said Body.** B. R. Billmeyer, assignor to Armstrong Cork Co., both of Lancaster, Pa.

2,470,665. **In Gastro-Intestinal Suction Tube Apparatus, a Perforated Protective Hood Including Inner and Outer Sacs of Soft, Tissue-Like Rubber.** C. W. Stiehl, South Milwaukee, Wis.

2,470,676. **Pneumatic Vehicle Suspension.** E. B. Aldous, Gansevoort, N. Y.

2,470,723. **Flexible, Plastic Fastening.** P. C. Roche, assignor to National Organ Supply Co., both of Erie, Pa.

2,470,800. **Connecting Device Including a Toroidal Rubbery Ring.** B. N. Ashton, assignor to Electrol, Inc., Kingston, N. Y.

2,470,817. **Flexible Golf Tee.** H. D. Hendricks, Seattle, Wash.

2,470,885. **Pairs of Rubber Rings in a Rail Car Wheel Assembly.** R. J. Burrows and A. O. Williams, both of Battle Creek, assignors to Clark Equipment Co., Buchanan, both in Mich.

2,470,886. **Insulating Bushing for Electrical Conduits, Etc.** F. A. Buzzell, Chicago.

2,470,921. **Window Having at Least One Pane of Flexible Plastic Material.** A. B. Dow, Midland, Mich.

2,470,970. **In Electrical Apparatus for Use in Obstetrics, a Thin Tin Folio Carried by a Thick Plate of Sponge Rubber, and a Belt of Elastic Fabric Carrying the Plate of Sponge Rubber.** F. Benoit, Vassy, France.

2,471,008. **Bath Mat of Resilient Material with Integral Vacuum Cup Gripping Members Formed therein.** G. E. Pretty, assignor to Pretty-Scheffer Co., both of Coshocton, O.

2,471,040. **In an Electric Switch, an Inflated Bulb and a Flexible Partition Mounted within the Bulb.** J. L. Mohar, Long Beach, Calif.

2,471,063. **Nose Guard of an Integral One-Piece Plaque of Unreinforced Molded Nylon Plastic Material.** A. R. Devoe, assignor to Bishop Co., both of North Attleboro, Mass.

2,471,172. **Nipple and Cap for Nursing Bottle.** D. Stoller, Brooklyn, N. Y.

2,471,224. **For Preventing the Accumulation of Ice on an Airfoil, an Inflatable Boot of Rubbery Material with an Exposed Surface Including a Flexible, Elastic Silicone.** D. L. Loughborough, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,471,285. **In a Valve, Including a Cylinder, a Plunger of Plastic Material Slidable in the Cylinder.** D. Y. Rice, Avon Lake, O.

2,471,329 and 2,471,395. **Metal Measuring Tape with an Elastic Synthetic Resin Pigmented Coating.** A. W. Keuffel, Essex Fells, assignor to Keuffel & Esser Co., Hoboken, both in N. J.

Dominion of Canada

456,279. **Rubber Dam Clamp for Dental Use.** K. A. S. Karlstrom, Gavle, Sweden.

456,322. **Gas and Liquid Insulated Cable.** W. T. Peirce, Worcester, Mass., assignor to American Steel & Wire Co., of New Jersey, Cleveland, O., both in the U.S.A.

456,334. **In a Buoyant Electric Cable, a Core Formed of Lengths of Expanded Hard Rubber Alternating with Shorter Lengths of Expanded Soft Rubber.** G. M. Hamilton, assignor to Callender's Cable Construction Co., Ltd., (in voluntary liquidation), assignor by H. Hockley, liquidator, to British Insulated Callender's Cables, Ltd., all of London, England.

456,335. **Buoyant Cable Having a Core of a Continuous Length of Flexible Cellular Material.** P. V. Hunter, assignor to Callender's Cable & Construction Co., Ltd., (in voluntary liquidation), assignor by H. Hockley, liquidator, to British Insulated Callender's Cables, Ltd., all of London, England.

456,336. **Buoyant Cable Having a Core of Soft Cellular Rubber Separated at Intervals by Hard Disks and Enclosed in a Rubber Envelope Forming an Adherent Skin on the Cellular Rubber.** G. M. Hamilton, assignor to Callender's Cable & Construction Co., (in voluntary liquidation), assignor by H. Hockley, liquidator, to British Insulated Callender's Cables, Ltd., all of London, England.

456,395. **In a Repeatered Submarine Signalling Cable, a Water-Repellant Dielectric Surrounding the Repeater and Jointed to the Dielectric of the Cable.** W. K. Weston, London, England, assignor to International Standard Electric Corp., New York, N. Y., U.S.A.

456,459. **Seamless, Fashioned, Two-Way Stretch Knitted Garment.** N. B. Reed, assignor to Surgical Products Inc., both of Lowell, Mass., U.S.A.

456,476. **Anti-Skid Tread Surface for a Tire, Including Rubber in Which Coarse Saw Dust Has Been Incorporated.** C. A. and L. Gapen, both of Morgantown, W. Va., U.S.A.

456,492. **In a Poultry Plucking Machine, Elastic Strip Members.** G. W. Johnson, Raytown, Mo., U.S.A.

456,501. **In a Diaper Having a Disposable Insert, a Resilient Wall around a Pad-Receiving Area and an Overlay of Impervious Material.** F. K. Rickerson, Seattle, Wash., U.S.A.

456,541. **Plasticized Polyvinyl Acetal Resin Layer in a Safety Glass.** J. H. Sherts, Tarentum, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,542. **Interlayer of Plasticized Polyvinyl Acetal Resin for Safety Glass.** H. R. Marini, New Kensington, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,544. **In a Laminated Structure Having Light Polarizing Layers with Holes there-through, Layers of Resinous Material with Integral Bonding Connections Extending through the Openings.** J. H. Sherts, Pittsburgh, and R. A. Miller, Tarentum, both in Pa., U.S.A., assignors to Duplate Canada, Ltd., Oshawa, Ont.

456,547. **In a Method of Making a Laminated Glass Unit, the Use of a Rubber Bag.** M. D. Lardin, Tarentum, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,550. **In a Window Construction, Including a Double Glazed Unit, a Central Sheet of Tough Resilient Plastic, Layers of Softer Organic Plastic on Opposite Sides of the Central Sheet, the Combined Sheet and Layers of Plastic Extending from One Panel to Form a Mounting Flange.** S. F. Cox, Pittsburgh, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,559. **In Apparatus for Running Marginal Cuts along Sheet Glass, Flexible Diaphragms Adapted to Be Pressed against the Glass by Fluid Pressure.** W. Owen, Pittsburgh, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,570. **Vaned Tire.** R. W. Hursh, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

456,571. **Vane Unit for Application to a Tire.** R. J. Hull and R. W. Hursh, both of Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

456,579. **Electrical Conductor Having an Insulating Covering Wholly or Partly of Polyethylene Terephthalate.** A. A. Drummond, Gerrards Cross, B. Jacob, Datchet, and B. J. Habgood, Blackley, assignors to Imperial Chemical Industries, Ltd., London, all in England.

456,589. **In a Liquid-Filled Dash-Pot, a Diaphragm of Flexible Material Impervious and Resistant to the Liquid.** F. Newton, Sudbury, assignor to Newton Bros. (Derby), Ltd., Derby, both in England.

456,666. **Heat Dissipating Cot of Rubber or Rubber-Like Material for Textile Rolls.** A. J. Maino, New Bedford, Mass., U.S.A.

456,677. **Swimming Pallet.** A. Robillard, Shefford ouest, P.Q.

456,729. **Air Bag Stem Including a Rubber Block Adapted to Be United with the Material of the Air Bag.** J. C. Crowley, Willoughby, assignor to Dill Mfg. Co., Cleveland, both in O., U.S.A.

United Kingdom

621,333. **Bushes for Flexible Bearings.** Dunlop Rubber Co., Ltd., and H. Wilson.

621,355. **Resilient Mounting Bushes.** N. B. Newton and C. S. R. Stock.

621,435. **Inflatable Mattress.** Elliot Equipment, Ltd., and G. Ward.

621,441. **Resilient Mounting for Self-Closing Doors.** Dunlop Rubber Co., Ltd., and R. M. Seddon.

621,444. **Tire Curing Bags.** United States Rubber Co.

621,514. **Bags for Bag Molding.** British Insulated Callender's Cables, Ltd., and P. Jones.

621,638. **Resilient Mountings.** Metalastik, Ltd., and A. J. Hirst.

621,693. **Resilient Mountings.** Pirelli Soc. per Azioni.

621,841. **Resilient Mounting Devices.** British Thomson-Houston Co., Ltd.

621,986. **Flexible Joint.** Dunlop Rubber Co., Ltd., and R. M. Seddon.

622,116. **Respirator Masks.** B. S. Kent and J. D. B. Wilson.

622,136. **Means for Resiliently Mounting Engines on Vehicle Chassis.** Sparshatt & Sons (Southampton), Ltd., and G. W. Sparshatt.

622,147. **Shaft Transmission Couplings, Etc.** Rubber Bonders, Ltd., and R. Boole.

622,246. **Electric Cables.** Telegraph Construction & Maintenance Co., Ltd., E. W. Smith, and F. Jones.

622,346. **Elastic or Resilient Suspension System.** Cie. pour la Fabrication des Compteurs & Materiel d'Usines a Gas.

PROCESS

United States

2,468,731. **Ornamented Embossed Thermoplastic Articles.** G. W. Borkland, Marion, Ind.

2,469,398. **Forming a Synthetic Resin Powder/Diamond Cutting Wheel.** E. Meyer, assignor to Abrasive Dressing Tool Co., both of Detroit, Mich.

2,469,710. **Uniting a Low-Temperature Isoolefin-Diolefin Interpolymer to Another Solid Body.** F. P. Baldwin, Pluckemin, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,469,849. **Splicing a Tube of Unvulcanized Butyl Rubber.** F. F. Silver, assignor to Wingfoot Corp., both of Akron, O.

2,469,892. **Producing Hollow Articles by Deposition of Aqueous Dispersion Material.** D. G. Rempel, assignor to Rempel Enterprises, both of Akron, O.

2,469,894. **Improving the Surface of Synthetic Sponge Rubber by Heating Prior to Gelling.** T. H. Rogers, Jr., assignor to Wingfoot Corp., both of Akron, O.

2,470,001. **Uniformly Colored Extruded Articles from Vinyl Aromatic Resins.** K. E. Stober, assignor to Dow Chemical Co., both of Midland, Mich.

2,470,089. **Molding Plastic Shoes.** J. J. Booth, Dallas, Tex.

2,470,111. **Applying a Rubbery Solution to Pelts and Hides to Prevent Shedding of Hairs from Pores.** G. A. Rubissow, New York, N. Y.

2,470,772. **Making Ice-Removing Apparatus from a Rubbery Material with Which a Liquid Polymeric Silicone is Associated.** E. G. Haas, Copley Township, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,470,990. **Fluid Containing Bodies from Heat-Sealable Plastic Sheet Materials.** F. H. Kennedy, New York, N. Y.

2,471,043. **Mechanically Treating Used Rubber Tires Containing Embedded Metallic and Non-Metallic Foreign Particles.** E. L. Schenck, Hughesville, Pa., assignor of one-fourth to B. Epstein, one-fourth to L. S. Epstein, and one-fourth to S. W. Epstein, all of Norfolk, Va.

2,471,392. **Refining Reclaimed Rubber with Cooling of the Rubber to Facilitate Separation of Tailings.** C. H. Campbell, Kent, O.

Dominion of Canada

456,355. **Molding Irregularly Shaped Articles of High Impact Plastics.** K. H. Bowen and H. C. Nelson, Jr., assignors to Columbia Rope Co., all of Auburn, N. Y., U.S.A.

456,545. **A Light Polarizing Medium.** L. A. Keim, Tarentum, Pa., U.S.A., assignor to Duplate Canada, Ltd., Oshawa, Ont.

456,630. **Packaging Articles in Rubber Hydrochloride Film.** C. M. Carson, Cuyahoga Falls, assignor to Wingfoot Corp., Akron, both in O., U.S.A.

456,650. **Forming Hollow Plastic Articles from Resin-Impregnated Fibers.** C. A. Evans, Atlanta, Ga.

United Kingdom

621,146. **Reinforcing Worn or Damaged Tires.** C. C. Jackson.

621,796. **Strips, Bands, and the Like of Thermoplastic Materials.** S.P.A. Lavorazione Materie-Plastiche.

621,950. **Laminated Products.** G. F. Rayner (Sylvania Industrial Corp.).

621,978. **Providing Pliable Sheets of Thermoplastic Materials with a Woven Fabric Appearance.** L. Rado.

622,106. **Wrappings or Packings for Small Objects from Sheets of Plastic Material.** C. Nicolle.

622,260. **Winding Plastic Sheet Material.** P. Shaw.

CHEMICAL

United States

2,468,769. **Production of Adducts of Unsaturated Acids with Cyclic Polymers of Hexadienes.** R. C. Morris and J. L. Van Winkle, Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,468,822. **Production of a Thermoplastic Resin from an Unsaturated Hydrocarbon Distillate Derived from Hydrocarbon Polymers Resulting from the Treatment of Cracked Gasoline with a Polymerizing Adsorbent.** W. K. Griesinger, Drexel Hill, assignor to Atlantic Refining Co., Philadelphia, both in Pa.

2,468,869. **Organosilicon Compositions.** W. H. Daudt, assignor to Corning Glass Works, both of Corning, N. Y.

2,468,881. **Manufacture of 3-Tetrahydrofuranone.** A. W. Johnson, Blackley, assignor to Imperial Chemical Industries, Ltd., London, both in England.

2,468,923. **Aqueous Emulsion Polymerization of Vinyl Acetate with the Aid of an Unsaturated Acid of the Formula $C_n H_{2n-1}$ COOH, in Which $_n$ Is 9 to 17.** W. R. Cornthwaite, Wilmington, Del., and H. W. Bryant, Niagara Falls, N. Y., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington.

2,468,975. **Plastic Composition Including a Vinyl Resin and a 4,4′-Bis-Alkyl-Carbonate (Diphenyl Alkane).** F. J. Held, Jr., and R. P. Blaine, both of Cleveland, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,468,982. **Condensation of Phenols with a Carbonyl Compound in an Acidic Medium in the Presence of a Catalyst of the Class of Mercapto-Substituted Aliphatic Carboxylic Acids and their Mercaptols and Mercaptals.** J. E. Jansen, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,468,989. **Wrinkle Drying Coating Composition Including a Conjugated Double-bonded Oil and a Butadiene Rubber Solution.** E. L. Luaces, Dayton, O., assignor to New Wrinkle, Inc., Wilmington, Del.

2,469,017. **In the Aqueous Emulsion Polymerization of Butadiene-1,3 in the Presence of a Peroxygen Compound, the Step of Supplying to the Emulsion, When a Proportion of the Material Is Polymerized and the Remainder Remains Unpolymerized, an Organic Compound of Quinonoid Structure and a Water-Soluble Inorganic Sulfide to Terminate Polymerization.** S. A. Sundel, Akron, O., assignor to B. F. Goodrich Co., New York.

2,469,101. **Preserving Rubber by Treating with the Condensation Product of a Dihydroxy Substituted Benzene Having the Empirical Formula $C_6H_6O_2$ and a Dihydric Alcohol.** E. S. Blake, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,469,110. **Preparation of Beta Lactones.** H. J. Hagemeyer, Jr., Kingsport, Tenn., assignor to Eastman Kodak Co., Rochester, N. Y.

2,469,132. **Organic Sulfur-Containing Product, of Molecular Weight of 500 to 3,000 Resulting from the Interaction in Aqueous Emulsion of Butadiene, a Comoner from the Group of Styrene, Acrylonitrile, and Methyl Methacrylate, and an Aliphatic Mercaptan.** W. A. Schulze and W. W. Crouch, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.

2,469,141. **Composition Including a Non-Colloidal Dispersion of a Polysulfide Polymer in a Solution of a Resin in a Water Insoluble Liquid.** R. O. Alexander, assignor to Thiokol Corp., both of Trenton, N. J.

2,469,154. **Vinylphenyltrihalosilanes.** R. H. Bunnell and D. B. Hatcher, assignors to Libbey-Owens-Ford Glass Co., Toledo, O.

2,469,157. **Thermosetting Urea-Formaldehyde Composition.** D. E. Cordier, assignor to Libbey-Owens-Ford Glass Co., both of Toledo, O.

2,469,288. **Homopolymer of a Di-Allyl Acetal of a Saturated Aliphatic Aldehyde of 1 to 4 Carbon Atoms.** D. E. Adelson and H. F. Gray, Jr., both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,469,295. **Resinous Copolymer of Vinyl Pyridine and a Ketone.** R. L. Meier and W. E. Elwell, both of Berkeley, assignors to California Research Corp., San Francisco, both in Calif.

2,469,318 and 2,469,320. **Low Viscosity Polyvinyl Butyral Resins, and Applications.** D. R. Swan, Berea, O., assignor, by mesne assignments, to Pittsburgh Plate Glass Co., Pittsburgh, Pa.

2,469,326. **Interpolymerization of Thiophene and Butadiene.** P. D. Caesar, Wenonah, and A. N. Sachanen, Woodbury, both in N. J., assignors to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,469,355. **Alkylhalosilanes.** L. De Pree, Holland, and A. J. Barry and D. E. Hook, assignors to Dow Chemical Co., all of Midland, both in Mich.

2,469,372. **Non-Slipping Material Including Rubber, Pigment, and Particles of Cork and Hardwood.** R. W. Cithill, Springfield Township, Pa.

2,469,404. **Polymeric Condensation Product from Formaldehyde and a Glycol of the Formula OH.R.SS.R.OH, where R Is a Divalent Alkylene Radical.** J. C. Patrick, Morrisville, Pa., assignor to Thiokol Corp., Trenton, N. J.

2,469,407-409. **Treating Textile Materials with a Resin-Forming Solution Including a Salt of Copolymerized Styrene Maleic Anhydride and Another Substance.** D. H. Powers Winchester, and E. H. Rossin, Melrose, both in Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,469,431. **Preparing a Water-Insoluble, Oil-Impermeable Product from a Water-Soluble Cellulose Ether.** A. E. Broderick, South Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,469,529. **Reclaiming Natural and Synthetic Rubber Scrap by Heating in the Presence of a Bis (Alkoxy Aryl) Disulfide.** L. B. Tewksbury, Jr., Potsdam, N. Y., and L. H. Howland, Waterbury, Conn., assignors to United States Rubber Co., New York, N. Y.

2,469,625. **Treating Hydrophilic Substance with an Organo-Silicon Compound to Render It Water Repellent.** A. J. Barry, assignor to Dow Chemical Co., both of Midland, Mich.

2,469,682. **Monoazo Dye Compounds Containing a Butadiene-1,3 Grouping.** J. B. Dickey, assignor to Eastman Kodak Co., Rochester, N. Y.

2,469,696. **Water-Soluble Polyacrylamide.** L. M. Minsk and W. O. Kenyon, assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,469,705. **Beta Butyro Lactone.** H. G. Stone, Kingsport, Tenn., assignor to Eastman Kodak Co., Rochester, N. Y.

2,469,721. **Electric Cable Composition Including Butadiene-Acrylonitrile Copolymer and Polymerized Vinylidene Chloride.** P. T. Gidley, Fairhaven, Mass., assignor, by mesne assignments, to Standard Oil Development Co., a corporation of Del.

2,469,726. **Removing Sulfur from Tri-Isobutylene.** W. G. Hockberger, Baton Rouge, La., assignor to Standard Oil Development Co., a corporation of Del.

2,469,748. **Plastic Rubber-Like Composition Including an Interpolymer of Isobutylene and a Conjugated Diolefin Having 4 to 8 Carbon Atoms per Molecule, with Dibenzyl Azelate as Plasticizer.** W. C. Smith, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,469,788. **Low-Temperature Polymerization of a Mixture of an Isoolefin and a Ketone.** J. B. Rust, West Orange, N. J., assignor to Montclair Research Corp., a corporation of N. J.

2,469,819. **Vulcanizing a Rubber Composition, Which Includes Reacting an Unvulcanized Rubber Having Residual Olefinic Groupings with a Compound of the Formula**

$$R-\left[O-\overset{O}{\overset{\|}{C}}N=N\overset{O}{\overset{\|}{C}}-O-R'\right]_x$$

in Which R′ and R Are, Respectively, Monovalent and Multivalent Radicals of the Groups of Hydrocarbon, Oxahydrocarbon, and Thiahydrocarbon Radicals and the Corresponding Halo- and Nitro-Substituted Radicals, and x Is an Integer between 2 and 5. P. J. Flory, Kent, and N. Rabjohn, assignors to Wingfoot Corp., both of Akron, both in O.

2,469,823. **Obtaining Alkyl Thiophenes.** R. C. Hansford, Woodbury, and P. D. Caesar, Wenonah, both in N. J., assignor to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,469,824. **A Methylol Dithionaphthoate.** A. F. Hardman, assignor to Wingfoot Corp., both of Akron, O.

2,469,827. **Coagulating a Synthetic Rub-**

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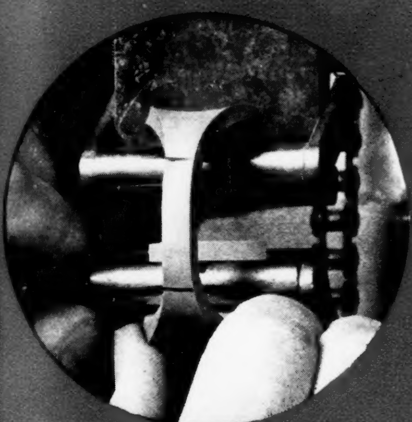

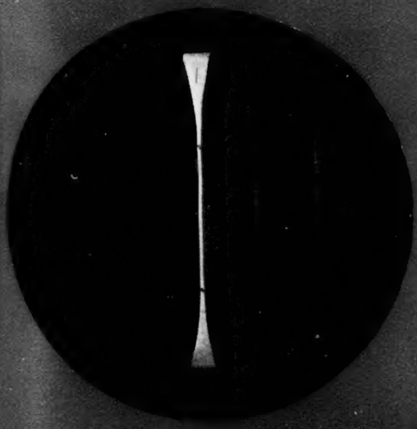

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IMPROVED DIELECTRIC PROPERTIES

- dielectric strength ______________ 700-900 volts per mil
- dielectric constant
  - at 100 cycles per second ____________________ 3.1
  - at 1,000,000 cycles per second _______________ 3.0
- power factor
  - at 100 cycles per second __________________ 0.2%
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PLUS LOWER COST

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ber Latex by Adding a Water Soluble Salt of a Metal from the Group of Lead, Iron, Calcium, Magnesium, Strontium, Barium, Aluminum, and Zinc in the Presence of Ammonium Hydroxide or the Alkali Metal Hydroxides. J. P. Johnson, assignor to Wingfoot Corp., both of Akron, O.

2,469,836. **Beta-Cyano Vinyl Acetic Acid Esters.** C. R. Milone, assignor to Wingfoot Corp., both of Akron, O.

2,469,845. **Rubber Copolymers of (Trifluoromethyl) Vinyl Aromatic Compounds.** M. W. Renoll, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,469,847. **Producing Insoluble Filamentary Reaction Products from Rubbery Polymers with the Aid of Sulfur Dioxide.** G. E. Rumscheidt and W. L. J. de Nie, both of Amsterdam, Netherlands, assignors to Shell Development Co., San Francisco, Calif.

2,469,848. **Preparation of Fluorohydrocarbons.** L. F. Salisbury, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,469,883. **Preparation of Solid Elastic, Curable Methylpolysiloxane.** J. Marsden and G. F. Roedel, both of Schenectady, N. Y., assignors to General Electric Co., a corporation of N. Y.

2,469,890. **Linear Methylpolysiloxanes.** W. I. Patnode, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,470,065. **Emulsion Polymerization of Butadiene and Styrene in the Presence of a Water-Soluble Soap and an Inert Water-Soluble Organic Solvent for the Soap.** C. E. Barnes, Belvedere, N. J., assignor to General Aniline & Film Corp., New York, N. Y.

2,470,115. **Stable Dispersion Containing Polyethylene Polysulfide Particles in Aqueous Medium Prepared from an Aqueous Reaction Mixture Containing an Ethylene Dihalide, a Water-Soluble Polysulfide and a Lignin Sulfonate.** W. D. Stewart, Yonkers, assignor to B. F. Goodrich Co., New York, both in N. Y.

2,470,130. **Caustic Resistant Etherified Phenol-Formaldehyde Resins.** H. L. Bender and A. G. Farnham, both of Bloomfield, N. J., assignors to Bakelite Corp., a corporation of N. J.

2,470,166. **Polymerizing Ethylene with a Catalyst Consisting of Silica Gel, Chromia and Either Nickel or Cobalt.** S. J. Hetzel, Cheltenham and R. M. Kennedy, Drexel Hill, assignors to the Sun Oil Co., Philadelphia, all in Pa.

2,470,168. **Polymeric 4-Vinylcyclohexene Dioxide Compositions.** W. J. Hornbrook, Mc-Masterville, assignor to Canadian Industries, Ltd., Montreal, both in P.Q., Canada.

2,470,171. **Polymerization of Olefins with a Catalyst Consisting of Silica Gel, Chromia, and Either Nickel or Cobalt.** R. M. Kennedy, Drexel Hill, and S. J. Hetzel, Cheltenham, assignors to Sun Oil Co., Philadelphia, all in Pa.

2,470,207. **Isobutylene Extraction.** B. S. Garrett, Brooklyn, N. Y., assignor to Standard Oil Development Co., a corporation of Del.

2,470,324. **Polymerizing in Aqueous Emulsion a Mixture of a Halogen-Containing Ethenoid with an Unsaturated Glycidal Ester.** H. P. Staudinger, Ewell, D. Faulkner, Cambridge, and M. D. Cooke, Banstead, all in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

2,470,329. **Acid Resistant Molding Composition Including Asphalt Mixed with a Cellulosic Fiber Impregnated with a Copolymer of Styrene and Maleic Anhydride.** R. A. Barkhuff, Jr., Haxardville, Conn., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,470,361. **Reclaiming Plastic Scrap.** I. Miller, New York, and A. L. Beister, Jackson Heights, assignors to Gem Participations, Inc., New York, both in N. Y.

2,470,362. **Melamine-Formaldehyde Casting Resin.** H. W. Mohrman, Springfield, Mass., assignor to Monsanto Chemical Co., a corporation of Del.

2,470,393. **Urea Formaldehyde-Type Molding Compounds.** E. Glycofrides, Toledo, O., assignor to Owens-Illinois Glass Co., a corporation of O.

2,470,394. **Production of Furfural Alcohol Compounds.** E. Glycofrides, Toledo, O., assignor to Owens-Illinois Glass Co., a corporation of O.

2,470,417. **Production of Emulsion Polymerizates of Conjugated Diolefins of 4 to 6 Carbon Atoms per Molecule in the Presence of Selectively Hydrogenated Tallow Soaps.** B. M. Vanderbilt, Westfield, and J. D. Hetchler, Rutherford, both in N. J.; B. M. Vanderbilt assignor to Standard Oil Development Co., a corporation of Del.; and J. D. Hetchler assignor to Archer-Daniels-Midland Co., Minneapolis, Minn.

2,470,447. **Polymerization of an Isoolefin and a Polyalkylated Phenol at Low Temperature in the Presence of a Friedel-Crafts Catalyst Dissolved in a Non-Complex Forming Solvent.** C. F. Van Gilder, Roselle, N. J., assignor to Standard Oil Development Co., a corporation of Del.

Dominion of Canada

456,016. **Improved Process for Reclaiming Vulcanized Rubber.** R. C. Davies, Walton, England, assignor to Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.

456,019. **Modified Maleic Anhydride-Terpene Reaction Product.** W. E. Lundquist, Minneapolis, Minn., U.S.A., assignor to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington Del., U.S.A.

456,020. **Mixture of Compounds of the Formula $H(CHRCH_2)_nCl$, Where n is a Plural Integer and R Is from the Group of Aryl, Haloaryl and Cyano.** W. E. Hanford and J. Harmon, both of Wilmington, Del., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington.

456,021. **Thermosetting Formaldehyde-Treated Monoolefin Carbon Monoxide Polymers.** P. S. Pinkney, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

456,023. **Production of Hard Rubber by Heating a Precured Rubber Mix in a Chemically Inert Fluid Surrounding Medium at a Pressure of at Least 1,000 Pounds per Square Inch, to Inhibit Formation of Bubbles of Gaseous Reaction Products.** R. A. Kirby, assignor to Expanded Rubber Co., Ltd., both of Croydon, England.

456,093. **Precipitating Rubber Particles on Cellulosic Fibers by Mixing a Rubber Emulsion with a Suspension of the Fibers in an Aqueous Medium and Adding Lime to the Mixture.** J. H. Connover, Chicago, Ill., U.S.A.

456,191. **Elastic Insulating Tape Including a Backing of a Vinyl Chloride Polymer Blended with a Low Molecular Weight Liquid Plasticizer and a Non-Migrating High Molecular Weight Plasticizer and a Water-Insoluble and Non-Corrosive Tacky Adhesive.** R. J. Oace, New Canada Township, and R. B. Snell and E. E. Eastwold, assignors to Minnesota Mining & Mfg., Co., all of St. Paul, both in Minn., U.S.A.

456,208. **Composition for Forming Viscose Sponge.** N. Drisch, assignor to Société de la Viscose Française, assignor to Société Novacel all of Paris, France.

United Kingdom

618,902. **Treatment of Polyvinyl Chloride.** J. Downing.

618,965. **Preparation of Haloacrylic Acid Esters.** General Aniline & Film Corp.

619,231. **Catalytic Polymerization of Olefins.** Phillips Petroleum Co.

619,275. **Polymeric Ureas.** Imperial Chemical Industries, Ltd., G. D. Buckley, and N. H. Ray.

619,356. **Anion Exchange Resins.** Imperial Chemical Industries, Ltd., J. R. Myles, and W. J. Levy.

619,394. **Vinyl Fluoride.** Imperial Chemical Industries, Ltd.

619,395. **Preparation of Difluoroethane.** E. I. du Pont de Nemours & Co., Inc.

619,500. **Resin Compositions.** W. N. Haworth and L. F. Wiggins.

619,513. **Aqueous Dispersions of Polymers of Substances Capable of Polymerization.** N. V. De Bataafsche Petroleum Mij.

619,576. **Polyamides.** Imperial Chemical Industries, Ltd., E. Ellery, and R. J. W. Reynolds.

619,619. **Obtaining Cellular Structures of Rubber and the Like.** J. A. Talalay.

619,620. **Polymerization of Chloroprene.** E. I. du Pont de Nemours & Co., Inc.

619,638. **Dielectric Materials.** British Insulated Callender's Cables, Ltd., W. F. Forrester, R. M. Hinde, and B. Szigeti.

619,646. **Molding Powders.** Standard Telephones & Cables, Ltd., and F. W. May.

619,758. **Stabilization of Halogenated Ethylenes Containing Fluorine.** E. I. du Pont de Nemours & Co., Inc.

619,870. **Aqueous Dispersions of Polymers of Substances Capable of Polymerization.** N. V. de Bataafsche Petroleum Mij.

619,905. **Curing Polyethylenes.** E. I. du Pont de Nemours & Co., Inc.

619,975. **Oil-Modified Alkyd Resins and Coating Compositions Prepared thereof.** British Resin Products, Ltd., E. M. Evans, E. M. Riley, and L. R. Anthony.

620,034. **Resinous Copolymerization Products.** Bakelite, Ltd.

620,116. **Nitrogen-Containing Linear Polymers.** H. Dreyfus.

620,153. **Synthetic Resin Compositions.** Crane Packing Co.

620,296. **Stabilization of Tetrafluoroethylene.** E. I. du Pont de Nemours & Co., Inc.

620,412. **Urea Formaldehyde Resinous Materials.** British Resin Products, Ltd., J. D. Morgan, and J. F. Williams.

620,494. **Linear Polyesters.** J. G. N. Drewitt and J. Lincoln.

620,678. **Forming Composite Ester Material.** B. F. Goodrich Co.

620,690. **Araliphatic Amines.** J. R. Geigy A. G.

620,692. **Polymerizable Polysiloxane Compounds.** British Thomson-Houston Co., Ltd.

620,693. **Methyl Vinyl Polysiloxane-Methacrylate Copolymers.** British Thomson-Houston Co., Ltd.

620,697. **Synthetic Wax-Resin Compositions.** British Thomson-Houston Co., Ltd.

620,698. **Synthetic Resinous Compositions.** British Thomson-Houston Co., Ltd.

620,734. **Preparation of n-vinyl Carbazole.** British Thomson-Houston Co., Ltd.

620,842. **Resinous Polymers.** Firestone Tire & Rubber Co.

620,855. **Bromine-Containing Compounds.** United States Rubber Co.

620,888. **Furan Derivatives.** Imperial Chemical Industries, Ltd., E. Hoggarth, and N. E. Taubman.

620,963. **Carbon-Dioxide-Modified Polymers of Ethylene.** E. I. du Pont de Nemours & Co., Inc.

620,964. **Polymerization Products of Ethylene.** E. I. du Pont de Nemours & Co. Inc.

620,993. **Adhesive Compositions.** E. I. du Pont de Nemours & Co., Inc.

621,004. **Rubber Antioxidants.** Imperial Chemical Industries, Ltd., A. S. Briggs, and J. Haworth.

621,009. **Organo-Silicon Compounds.** F. G. Fife (Corning Glass Works).

621,044. **Synthetic Resinous Compositions.** Bakelite Corp.

621,046. **Compositions for Game-Ball Cores.** Dunlop Rubber Co., Ltd., D. F. Twiss, and A. E. T. Neale.

621,090. **Synthetic Resins.** British Celanese, Ltd.

621,102. **Linear Polyesters.** J. G. N. Drewitt and J. Lincoln.

MACHINERY

United States

2,468,760. **Apparatus to Produce Hollow Rubber Articles.** D. C. Pempthorn, Akron, assignor to Sun Rubber Co., Barberton, both in O.

2,469,130. **Apparatus for Forming Hollow Articles from Plastic Material.** I. P. Rodman, Jr., West Orange, assignor to Celluplastic Corp., Newark, both in N. J.

2,469,342. **Apparatus for Molding Plastics.** H. M. Richardson, Springfield, Mass., assignor, by direct and mesne assignments, of one-half to Grotelite Co., Inc., Bellevue, Ky., and one-half to Lima-Hamilton Corp., Hamilton, O.

2,469,633. **Apparatus to Form Tire Retreading Strips.** W. G. Corson, Barberton, O.

2,469,892. **Apparatus for Producing Hollow Articles by Deposition of Aqueous Dispersion Material.** D. G. Rempel, assignor to Rempel Enterprises, both of Akron, O.

2,469,972. **Machine to Weld Thermoplastic Films.** R. D. Lowry and W. R. Church, assignors to Dow Chemical Co., all of Midland, Mich.

2,469,999. **Extruder Mixing Head.** K. E. Stober, assignor to Dow Chemical Co., both of Midland, Mich.

2,471,324. **Apparatus for Advancing Non-Metallic Plastic Material.** G. E. Henning, Baltimore, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,471,359. **Tire Casing Repair Device.** N. Stevens, Chicago, Ill.

Dominion of Canada

455,455. **Extrusion Molding of Plastic Substances.** F. C. Goldhard, London, England.

455,624. **Patches and Rubber Sheeting Vulcanizer.** L. Steiner, Richmond, England.

455,640. **Apparatus for Making Footwear Having at Least a Sole of Vulcanized Elastomer.** A. B. Lewis, Mt. Royal, assignor to British Rubber Co. of Canada, Ltd., Westmount, both in P.Q.

455,669. **Device to Obtain Rubber or Rubber-Like Material from an Aqueous Dispersion thereof.** S. D. Taylor, E. W. Madge, and E. A. Murphy, Erdington, England, assignors to Dunlap Tire & Rubber Goods Co., Ltd., Toronto, Ont.

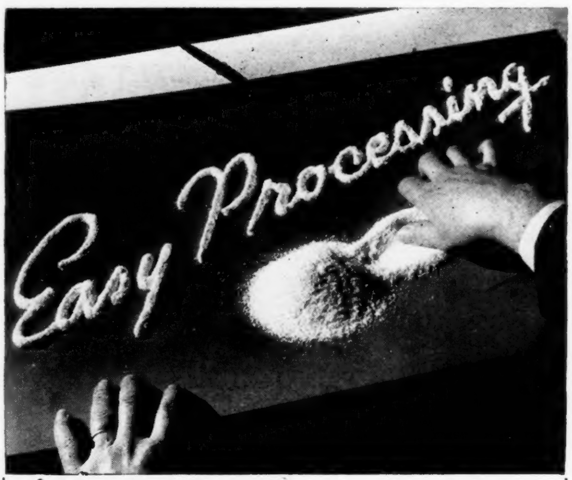
455,694. **Apparatus for Vulcanizing Rubber and Similar Material by Electrostatic Heating.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

456,100. **Plastic Molding Apparatus.** E. R. Knowles, Nashua, N. H., U.S.A.

456,140. **Machine for the Manufacture of Covered Electric Wires.** E. Tunnicliff, London, and J. Taylor and H. D. James, both of Leigh, assignors to British Insulated Callender's Cables, Ltd., London, both in England.

456,177. **Dual Vulcanizer.** G. P. Bosomworth, Akron, and D. C. Milner, Barberton,

Colonial
PORCELAIN
MADE TO ORDER



Easy Processing

assignor to Firestone Tire & Rubber Co., Akron, both in O., U.S.A.

456,228. **Apparatus for Molding Thermosetting Resin.** F. M. Adair and B. M. A. Trebes, Berwyn, and A. J. Brunner, Congress Park, both in Ill., assignors to Western Electric Co., Inc., New York, N. Y., both in the U.S.A.

456,246. **Means for Making Elastic Coil Cables with Uncoiled Ends Embodying a Vulcanizable Material.** R. D. Collins, Beverly Hills, Calif., assignor of one-half to Kellog Switchboard & Supply Co., Chicago, Ill., both in the U.S.A.

456,396. **Apparatus Used in Making Coaxial Cable.** W. K. Weston and E. Baguley, London, England, assignors to International Standard Electric Corp., New York, N. Y., U.S.A.

United Kingdom

620,576. **Machine for Forming Articles of Plastic Material.** S. E. Hancock.

620,660. **Apparatus for Building Tires.** General Tire & Rubber Co.

620,684. **Screw Presses.** S.P.A. Lavorazione Materie Plastiche.

620,806. **Rubber Sheeting Machine.** Planters Engineering Co., Ltd., and J. L. Jefferson.

620,976. **Mechanism for Transmission of Rotary Motion.** Dunlop Rubber Co., Ltd., and T. E. Davies.

621,098. **Electrically Heated Thermostatically Controlled Vulcanizers.** R. Gekiere and A. Brandenburg.

621,174. **Vulcanizers.** A. H. Stevens (Boston Woven Hose & Rubber Co.).

621,184. **Vulcanizer.** H. Simon, Ltd., and E. C. Woods.

621,751. **Apparatus for Molding Tires.** Dunlop Rubber Co., Ltd., and H. Willshaw.

621,867. **Apparatus for Making Laminated Sheet Materials.** Sylvania Industrial Corp.

621,956. **Vulcanizer.** B. F. Goodrich Co.

621,976. **Tire Vulcanizer.** L. H. Cohen.

622,135. **Vulcanizer.** A. H. Stevens (Boston Woven Hose & Rubber Co.).

622,137. **Vulcanizer.** A. H. Stevens (Boston Woven Hose & Rubber Co.).

622,256. **Calendering Device for Natural or Synthetic Rubber or Similar Materials.** Allmanna Svenska Electriska Aktienbolaget, F. Landau, and J. G. Norberg.

622,258. **Injection Molding Machine.** V. Vltavsky.

622,325. **Apparatus for Making Incisions in Rubber.** Imperial Chemical Industries, Ltd., J. M. Buist, and R. L. Kennedy.

622,336. **Apparatus to Mold Plastic Articles.** Ford Motor Co., Ltd.

UNCLASSIFIED

United States

2,468,885. **Pipe Joint.** J. Lubbock, London, England.

2,468,954. **Valve for Multicell Inner Tubes.** L. E. Bonham, Birmingham, Ala.

2,468,978. **Free-Flowing Composition of Pelletized Carbon Black on Which Has Been Absorbed a Mixture of Alkyl Thiazyl Disulfides.** A. L. Hollis, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,469,039. **Puncture Sealing Composition.** C. O. Hopping, Long Beach, Calif.

2,469,307. **Tool to Demonstrate the Self-Sealing Properties of an Inner Tube Inflated Inside a Tire.** F. E. Mechling, Akron, assignor to Seiberling Rubber Co., Barberton, both in O.

2,469,516. **Pipe Coupling.** E. S. Pearson, Portland, Oreg.

2,469,614. **Tire Chain Tool.** G. H. Sweeney, Los Angeles, Calif.

2,469,666. **Anti-Skid Chain.** H. Raz-Ammann, Thun, Switzerland; I. Raz-Ammann sole heiress of H. Raz-Ammann, deceased.

2,469,723. **Device to Break Tire Beads from the Flanges of a Drum or the Like on Which the Tire Is Mounted.** W. Greene, New York, N. Y.

2,469,931. **Trailer Tire Deflation Signal.** C. T. Pratt, Solvay, N. Y.

2,470,054. **Tire Wheel Creeper.** H. C. Schildmeier, Indianapolis, Ind.

2,470,107. **Collapsible Tire Remover.** F. Piacenti, New York, N. Y.

2,470,359. **Hose Coupling.** P. C. McLean, Hollywood, Calif.

2,470,529. **Composition for Protecting Plant Life from Destruction by Fungi and Insects.** W. D. Stewart, Yonkers, assignor to B. F. Goodrich Co., New York, both in N. Y.

2,470,538. **Four-Piece Hose Coupling.** J. N. Wolfram and S. W. Packard, assignors to Parker Appliance Co., all of Cleveland, O.

2,470,873. **Airplane Tire Valve Release Mechanism.** W. K. Seitz, Tampa, Fla.

2,471,041. **Scrubbing Machine for Fire Hose.** I. E. Parker, Transfer, and T. W. Brydon, Slippery Rock, both in Pa.

2,471,081. **End Sections in Hose for Transferring Fluids.** P. K. Saunders, Mamaroneck, N. Y.

Dominion of Canada

455,481. **Process to Prevent the Sticking of a Resinous Material to a Mold.** M. F. Smith, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

455,760. **Hose End Fitting.** H. J. Knaggs, assignor to Weatherhead Co., both of Cleveland, O., U.S.A.

455,814. **Anti-Skid Device for Vehicles.** M. Marthinson, Michigan City, Ind., U.S.A.

455,932. **Hose Coupling.** C. H. Crawley, assignor to Weatherhead Co., both of Cleveland, O., U.S.A.

455,969. **Low-Pressure Alarm for Vehicle Tires.** R. G. Miller, Eugene, Oreg., U.S.A.

456,103-104. **Wheel Structure.** G. A. Lyon, Allenhurst N. J., U.S.A.

456,247. **Method and Means for Reversing Elastic Coil Cable.** R. D. Collins, Beverly Hills, Calif., and R. J. Arnold, Western Springs, Ill., co-inventors, R. D. Collins, assignor of one-half to Kellog Switchboard & Supply Co., and R. J. Arnold, assignor to Cordage Inc., both of Chicago, Ill., assignor to Kellog Switchboard & Supply Co. and R. D. Collins.

456,337. **Cable Coupling.** L. G. Brazier and D. T. Hollingsworth, assignors to Callender's Cable & Construction Co., Ltd., (in voluntary liquidation), assignor, by H. Hockley, liquidator, to British Insulated Callender's Cables, Ltd., all of London, England.

456,776. **Fitting for Flexible Hose.** W. MacWilliams, Montville, assignor to Resistoflex Corp., Belleville, both in N. J., U.S.A.

United Kingdom

618,862. **Elastic Coupling between Two Coaxial Shafts.** R. Doussain.

618,942. **Means for Protecting Vehicle Tires.** W. C. Carlton.

619,113. **Wrapping Machine.** Wingfoot Corp.

620,105. **Apparatus for Making Coiled Yarn.** United States Rubber Co.

620,353. **Tire-Rims.** Kelsey-Hayes Wheel Co.

620,912. **Method and Apparatus of Packaging Articles.** Dunlop Rubber Co., Ltd., W. H. Hogg, and T. E. H. Gray.

621,075. **Tire Dismounting Tool.** Firestone Tire & Rubber Co.

TRADE MARKS

United States

442,589. **Aviatrix.** Shower caps, waterproof protective coverings, etc. Aviatrix Co., New York, N. Y.

442,593. **Mil-o-Film.** Plastic sheets or films. Milprint, Inc., Milwaukee, Wis.

552,608. **Koroseal.** Tank linings. B. F. Goodrich Co., Akron, O.

442,615. **Duroseal.** Cotton-backed plastic film sheeting. Stuart Mansfield Co., Inc., New York, N. Y.

442,617. **Cross*Over.** Footwear. J. Kandel, doing business as Kandel Shoe Co., New York, N. Y.

442,645. **Plastape.** Sealing tapes. Bemis Bros. Bag Co., Minneapolis, Minn.

442,649. **Elinstar.** Trusses, elastic hosiery, abdominal belts, etc. F. Longdon & Co., Ltd., Derby, England.

442,654. **Air Push.** Windshield wipers. C. A. Sprague, doing business as C. A. Sprague Devices, Michigan City, Ind.

442,665. **Cle-Draulic.** Shock absorbers. Cle-Draulic Co., Cleveland, O.

442,666. Representation of a shock absorber and the words: **"Cle Draulic."** Shock absorbers. Cle-Draulic Co., Cleveland, O.

442,677. **Forester.** Tires. B. F. Goodrich Co., New York, N. Y.

442,690. **Airubber.** Inflatable boats and floats. New York Rubber Corp., New York, N. Y.

442,691. Representation of a circle containing a sailboat and the word: **"Airubber."** Inflatable boats and floats. New York Rubber Corp., New York, N. Y.

442,696. **Velophane.** Plastic films. Firestone Tire & Rubber Co., doing business as Firestone Industrial Products Co., Akron, O.

442,704. **B R S.** Rubber compounding tar-like bituminous liquid. Allied Chemical & Dye Corp., New York, N. Y.

442,739. **Judy 'n' Johnny.** Swim caps and baby pants. Dandon Sales, Inc., New York, N. Y.

507,777. **Gold Seal.** Brake linings. L. J. Miley Co., Chicago, Ill.

507,778. **Miley.** Brake linings, clutch facings, and fan belts. L. J. Miley Co., Chicago, Ill.

507,848. Representation of an oval containing the word: **"Huber."** Fillers, pigments, and tackifiers. J. M. Huber Corp., New York, N. Y.

507,849. Representation of an oval containing the word: **"Huber."** Tackifiers, plasticizers, and accelerators. J. M. Huber Corp., New York, N. Y.

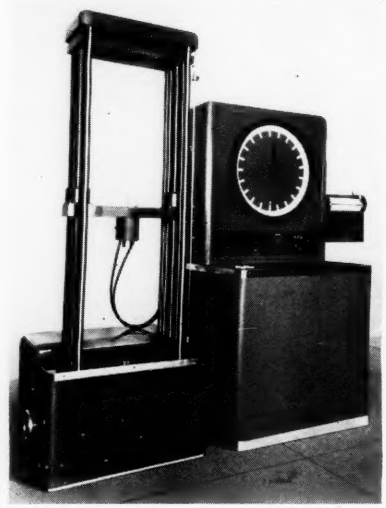
(*Continued on page* 518)

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, April, March, 1949; First Four Months, 1949, 1948

	April, 1949	% of Change from Preceding Month	March, 1949	First Four Months, 1949	First Four Months, 1948
Passenger Casings					
Shipments					
Original equipment	2,426,632		2,155,649	8,306,996	7,068,336
Replacement	3,202,451		2,692,843	10,283,337	11,825,948
Export	37,567		49,377	159,712	260,776
TOTAL	5,666,650	+15.70	4,897,869	18,750,045	19,155,060
Production	5,939,645	+10.79	5,361,336	20,855,406	22,597,645
Inventory end of month	10,705,291	+ 0.33	10,669,721	10,705,291	8,858,055
Truck and Bus Casings					
Shipments					
Original equipment	344,860		362,999	1,458,908	1,911,518
Replacement	515,609		536,375	2,107,321	2,308,327
Export	83,624		105,345	348,028	383,977
TOTAL	944,093	− 6.04	1,004,719	3,914,257	4,603,822
Production	1,019,670	−16.16	1,216,167	4,468,180	5,146,669
Inventory end of month	2,485,314	+ 2.66	2,420,855	2,485,314	2,082,228
Total Automotive Casings					
Shipments					
Original equipment	2,771,492		2,518,648	9,765,904	8,979,854
Replacement	3,718,060		3,229,218	12,390,658	14,134,275
Export	121,191		154,722	507,740	644,753
TOTAL	6,610,743	+12.00	5,902,588	22,664,302	23,758,882
Production	6,959,315	+ 5.80	6,577,503	25,323,586	27,744,314
Inventory end of month	13,190,605	+ 0.76	13,090,576	13,190,605	10,940,283
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,766,897		2,513,481	9,746,212	8,971,044
Replacement	2,551,952		2,565,115	9,810,337	11,072,096
Export	77,562		95,176	345,353	366,561
TOTAL	5,396,411	+ 4.30	5,173,772	19,901,902	20,409,701
Production	6,058,992	+ 1.87	5,947,598	21,990,713	22,298,289
Inventory end of month	11,747,607	+ 4.60	11,230,827	11,747,607	9,737,206

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

New Machines and Appliances



Baldwin Model PTE Universal Tester with Air Cell Mounted on Adjustable Crosshead

New Low-Range Testing Machine

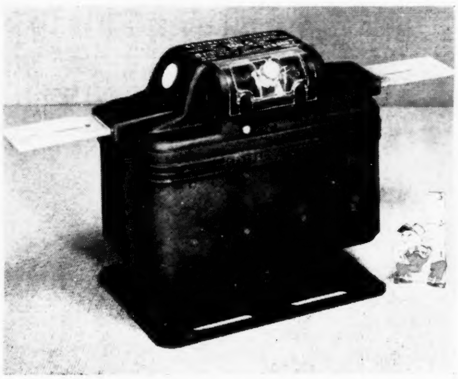
A NEW universal testing machine, Model PTE, having a capacity of 5,000 pounds, has been announced by Baldwin Locomotive Works, Philadelphia 42, Pa. Hydraulic and pneumatic load cells are used as elements in the weighing system, both operating on a Tate-Emery indicator. Four standard load ranges are provided by the hydraulic cell: 5,000 pounds, 1,000 pounds, 200 pounds, and 50 pounds. Two additional ranges of 10 pounds and two pounds are provided, when specified, by means of an air cell. The machine is suitable for testing plastics; fine wire; light metal foils; light structures of wood, plastic, or metal; textile materials; fibers; cord; paper; and others.

Tension space may be 3⅜ to 51 7/16 inches; compression space 0 to 48 inches; and clearance between the vertical screws is 18¼ inches. The indicator is contained in a separate cabinet, providing flexibility in relative positioning of the two units. Features of the cabinet design are heavy-gage sheet-steel construction, ample space for special accessories, accessibility to mechanism,

and indirectly lighted indicator dial. All loads are indicated on a 24-inch masked dial with a 66-inch scale. Load ranges are shifted instantly by solenoid-operated air valves controlled by a knob on the panel board.

Tension and compression loads are applied by a straining crosshead, which is motor-driven by two vertical screws giving a 49-inch stroke. Loading speeds are held constant by electronic controls in a 400:1 range of 0.05-inch to 20 inches a minute. Accuracy of load indications is within 0.5% of reading, or one scale division, for the upper three ranges, and within 0.75% of reading, or 1.5 scale divisions, for the lower three ranges.

A recorder may be used with the machine and will plot stress-strain curves with 10-inch ordinate for one-half or full capacity of any range. The machine designed for automatic reversal and cycling of loads, may be used with recorder to plot hysteresis curves automatically. The overall height is 83 inches, and, when set up as illustrated, the machine and indicator occupy a floor area of approximately 75 by 28 inches.



G-E's JKM-3 Butyl-Molded Current Transformer

Current Transformer Utilizes Butyl

A REVOLUTIONARY new instrument current transformer, the first of a new line of Butyl-molded transformers, has been announced by the meter and instrument divisions of General Electric Co., Schenectady 5, N. Y. Designated the JKM-3, the new unit is designed for accurate indoor metering and relay services. Rated at 5,000 volts at 25-60 cycles, it will be available with single primary in all preferred ratings, 10 to 800 amperes inclusive. The Butyl compound, injected under high pressure into the areas around the core, coils, and terminals, provides a homogeneous insulation that is resilient, resistant to oxidation, arcing, and moisture, and permanently positions the transformer components.

Special coil construction and contact of the Butyl with the windings provide increased heat dissipation which permits continuous operation up to 150% of rated load. The interleaved-core construction eliminates any possibility of reduction of accuracy resulting from mechanical shock caused by short circuits or careless handling. The transparent plastic terminal cover is so built that it cannot be put in place when the short-circuit switch is closed and meters or other devices are connected. The dimensions of the JKM-3 are such that it is interchangeable with other transformers.

Tire Production in Argentina

Trade circles put Argentina's tire production in 1948 at 900,000 units, against 975,000 units in 1947. It seems, however, that the decrease in units was due to the manufacture of large-size tires which were in short supply. Manufacturers operated to capacity in the second half of 1948, and it is held that they could continue to do so for another year before supply of heavy-duty tires overtook demand.

Consumption of rubber in 1948 is set at 17,000 tons and may reach 18,500 tons in 1949, chiefly as a result of the demand for large-size tires.

Dealers estimate tire imports in 1948 at 60,000 to 80,000 units, and of tubes at about 20,000 units. A large part of these imports arrived in the 90-day free entry period.

EUROPE

GREAT BRITAIN

Lutoids in Fresh *Hevea* Latex

The paper presented at the Rubber Conference held in London in June, 1948, by G. E. van Gils and L. N. Homans on "Fresh *Hevea* Latex—a Complete Colloidal System," aroused much interest at the time and later was included among several papers discussed at a special meeting of the Institution of the Rubber Industry in London.

Recent issues of *India Rubber Journal*[1] and of *Rubber Age and Synthetics*[2] contain, respectively, an explanatory letter by Miss Homans (now Mrs. de Haan-Homans) prompted by questions put at the special meeting referred to above, and a popularly written article by Dr. van Gils. From these sources the following is gathered:

It has for some time been recognized by investigators that *Hevea* latex is not a simple dispersion of rubber particles in an aqueous medium, the serum, but is a much more complex system. Frey-Wyssling, studying ammoniated latex under the microscope, discovered among the pear-shaped rubber particles occasional yellow particles, much larger than the rubber bodies, yet difficult to find, in shape perfectly spherical—the Frey-Wyssling globules. Van Gills and Homans have made the Frey-Wyssling globules and the lutoids their special study.

The lutoids, unlike the Frey-Wyssling globules, are soluble in alkalies, as ammonia, and coagulate when fresh latex is diluted with water; hence they can only be observed in fresh, unammoniated, undiluted latex. If a thin layer of such a latex is viewed under an ordinary microscope, the lutoids appear as clear, transparent, irregularly shaped islands in the glittering grey mass which the closely packed rubber particles in Brownian movement present. Sometimes Frey-Wyssling globules are embedded in the lutoids. If fresh non-ammoniated latex is centrifuged in a tube, the lutoids collect together at the bottom of the tube and form a greyish-yellow fraction that is sharply divided from an upper white fraction. It is emphasized that the yellow color of the lutoids is only discernible when they are thus massed together by centrifugation in a tube and is not apparent under the microscope, again unlike the Frey-Wyssling globules which contain much coloring matter that can be seen under the microscope. The Frey-Wyssling globules have a specific gravity between that of the rubber particles and of the lutoids so that on centrifugation they assemble in the upper part of the yellow fraction, forming a bright yellow layer between the duller lutoid fraction and the white upper fraction.

The yellow fraction generally constitutes about one-fifth to one-fourth of the total volume and differs considerably in its properties from that of the white fraction. The latter is a much purer latex, has a higher dry rubber content and yet is less viscous, than the original latex. The yellow fraction usually has a dry rubber content of 8 to 15%, contains a lot of non-rubber constituents and has a very high viscosity which tends to increase rapidly on standing. Whereas the original latex will, on standing, coagulate spontaneously after about eight hours, the white fraction may stay liquid for days; and the yellow fraction coagulates in two to four hours. Finally the yellow fraction has a much higher nitrogen and ash content than either the original latex or the white fraction. As Dr. van Gills points out, the lutoids are an important cause in the variability of rubber.

[1] Mar. 5, 1949, p. 3.
[2] Mar., 1949, p. 16.

Declining Demand for Tires

According to *Agence Economique et Financière*, March 15, 1949, most British tire manufacturers have decided to limit production, and several have laid off substantial numbers of workers. In the Midlands the policy in the main seems to have been not to discharge workers, but instead to refrain from replacing any of those who have left their jobs.

At Birmingham, Dunlop has restricted output and has laid off a small number of persons. Goodyear is reducing output of passenger-car tires, but no steps have been taken with regard to employes. The John Bull company at Leicester, though not in a position to utilize total productive capacity, will for the present retain all workers. Michelin Co. at Stoke-on-Trent is watching developments, but has made no decisions as yet.

The above seems to indicate a policy of watchful waiting on the part of many tire manufacturers. Certainly home demand slackened considerably in the early months of the current year, but this decline was largely ascribed to the restriction on the use of gasoline. Then the recent decision of the government to double the basic gasoline allowance for the three summer months should have a favorable effect on tire consumption. But it is pointed out, the situation is not so simple. The tire export business must be considered too, and here we find the activity of newly established or expanded branches of British and other firms in foreign countries, formerly importers of tires, tending to narrow the market for tires made in Britain.

Reports on Company Activities

George Spencer Moulton & Co., Ltd., Bradford-on-Avon, has opened a new research laboratory. The staff is headed by S. S. Pickles, the 1939 Colwyn Medalist. The company was 100 years old last year.

Sir J. George Beharrell, D.S.O., has resigned his chairmanship of Dunlop Rubber Co., Ltd., an office which he held since June, 1937. He has been with the company 26 years altogether, and as a tribute to his services, the company has created the office of president for him. Succeeding Sir George as chairman, is Sir Clive Baillieu, a director of Dunlop since 1929 and deputy chairman since 1945. Sir Clive is also a director of many other companies including mining and banking concerns. G. E. Beharrell, who joined Dunlop in 1928 and became managing director in 1943, is the new deputy chairman. J. H. Lord, on the board since 1947, becomes director of finance.

Dunlop recently announced that it had made arrangements to sell truck and bus tires to a value of $2,000,000 to Yugoslavia and that the first shipment had already left the factory. The tire deal takes place under a trade agreement between Britain and Yugoslavia to exchange British manufactures for Yugoslav food and grain.

The Goodyear Tire & Rubber Co. (Great Britain), Ltd., has finally started the manufacture of Pliofilm in England. Originally it planned this production in 1939, but the war caused these plans to be shelved until in March, 1947, they could be taken up again and work begun on erection of a factory. On February 25, Lord Ammon, in the unavoidable absence of Sir Stafford Cripps, formally opened the works in Wolverhampton. The factory is a two-story building of 26,490 feet, costing £41,535; it has been equipped at a further cost of £53,800.

To help finance its postwar development program, Goodyear Tire & Rubber Co. (Great Britain), Ltd., issued 800,000 4% cumulative redeemable preferred shares of £1 each in addition to 400,000 £1 shares made available to holders of the existing 4½% preference shares, called for redemption June 7.

Thomas De La Rue & Co. has embarked on a recentralization policy, as a result of which the business of its two wholly owned plastics subsidiaries has been transferred to the parent company. The concerns involved, De La Rue Insulation and Hill Norma and Beard Plastics, now operate as the plastics division. The status of the two remaining plastics companies of this group, De La Rue Extrusions and De La Rue Floors & Furnishings, remained unchanged as they are not wholly owned subsidiaries.

Rubber Industry Notes

The India Rubber Journal is preparing a comprehensive rubber trade directory of Great Britain. As planned, the directory will contain 15 main sections and several appendices. The sections will include: (1) rubber manufacturers and their products; (2) rubber machinery and equipment and suppliers; (3) instruments and laboratory equipment and suppliers; (4) chemicals and compounding ingredients and suppliers; (5) fabrics and textiles and suppliers; (6) components (for incorporation in finished rubber products) and their suppliers; (7) natural rubber and latices and suppliers; (8) synthetic rubbers, latices and kindred materials, and their suppliers; (9) reclaim suppliers; (10) scrap and waste rubber merchants; (11) manufacturers' sundry requirements and services and their suppliers; (12) trade marks and brand names used in the rubber industry; (13) trade and research organizations; (14) rubber technology schools and courses; (15) Who's Who in the British rubber industry.

Recent revised rubber export targets for the end of 1949 indicate exports of rubber tires are to reach a value of £1,250,000 a month by the end of the year; other rubber manufactures, a value of £670,000; and wires and cables £2,200,000. These figures with targets set for the end of 1948 at £850,000, £1,050,000, and £950,000, a month, respectively.

T. W. Fazakerley on May 31 resigned as director and general manager of P. B. Cow & Co., Ltd., and subsidiaries, with which he had been associated 20 years.

The Fourth Foundation Lecture of the Institution of the Rubber Industry was scheduled to be given in Birmingham on May 20, by G. Gee, who chose for his subject "Polymer Science and Rubber Technology." The main purpose of the lecture was to consider in broad terms some of the contributions which polymer science has made or might make to the more effective use of rubber.

The Board of Trade has announced the removal of control of the allocation of white lead and titanium oxide after April 1, 1949.

The Council of Industrial Design held an exhibition of flexible commercial packs and packaging materials May 3-31 in its exhibition hall in London. More than 60 firms demonstrated all kinds of packaging, current and new, among which were some processes never before shown publicly in England.

The India Rubber Journal calls attention to a recent British patent (No. 618,375) according to which a coagulant is obtained from rubber seed which leads to a sundried sheet having all the appearance of smoked sheet, but lacking the smoky odor. If widely adopted, the process should lead to considerable economies in the production of sheets on plantations, it is pointed out. As for the properties of the new sheet, vulcanization and aging data are said to be equal to those of normal smoked sheet, but the new type of sheet is somewhat harder to masticate.

At the annual general meeting of the Rubber Growers' Association, April 12, Charles Mann was reelected chairman, and H. B. Egmont Hake vice chairman for the ensuing year.

NETHERLANDS

History of the Rubber Manufacturing Industry

Rubber manufactures have been produced in the Netherlands since 1828, when the firm now known as N. V. Rubber, Asbest-en Ebonietfabrieken v/h Gebr. Merens, Haarlem, was started. Outside of the fact that in 1836, Jan van Geuns produced an improved type of rubber goods, little is known of the further development of the rubber industry here until the turn of the century. Progress was slow, and even around 1925 there were only about 11 factories of any size which together consumed roughly 1,200 tons of rubber including about 400 tons of reclaim. By 1938 there were 17 factories which used 3,260 metric tons of raw rubber and 507 tons of worked rubber, besides numerous firms which did not make their own mixes, but employed prepared compounds.

The chief manufactures were cycle tires, footwear, soles and heels, mechanical and household goods, dipped goods, rubberized fabrics and artificial leather, certain toys and adhesives. Production of some items covered a substantial part of the country's needs—85% in the case of cycle tires; but other goods, for instance automobile tires, had to be largely imported; on the average, however, it may be said that production sufficed to supply about 45% of the home market.

During the war the industry lost about one-third of its productive capacity as a result of bombings and removal of machinery by Germany. Reconstruction after the war proceeded rapidly, however, so that by 1947 the industry had not only recovered lost ground, but was producing far more goods of far better quality than ever before, with the range of goods now also including substantial amounts of automobile tires, foam rubber articles, sporting goods. In 1947, 20 factories had their own mixing equipment and together consumed 6,427 tons of raw rubber, 1,460 tons of worked rubber, and 329 tons of synthetic rubber; besides a large number of enterprises produced manufactures from prepared mixes. In the aggregate these small firms seem to have accounted for a fair proportion of the total consumption of rubber by the Netherlands, if total 1947 imports, as compared with the consumption of the 20 previously mentioned concerns, are any indication; total imports included 10,132 tons of crude rubber, 529 tons of latex, 2,982 tons old and waste rubber, and 36 tons of reclaim. Postwar figures show that while still very small, the export trade has advanced markedly, amounting to 7% of production in 1947, against 2% of production in 1938. In 1947 the industry employed about 6,000 workers.

Activity in the Netherlands rubber industry has been stimulated by the absence of German products from the home market, by research work by individual companies, and last, but by no means least, by the investigations and propaganda of the Rubber Stichting.

The results of the efforts of the Rubber Stichting are to be seen in the growing interest in foam rubber, rubber-cement mix-

tures, and rubber asphalt mixtures. Experiments to improve the properties of asphalt by the inclusion of rubber were first carried out by the Rubber Stichting during 1936-1940 and led to the development of road-surfacing materials and joint fillers for concrete roads, which have revealed properties attracting attention not only in different cities in Holland, but also in foreign countries.

Thus the Statens Vaginstitut, a Swedish Government institute devoted exclusively to research on road construction, called on the Rubber Stichting in the Fall of 1948 to cooperate in surfacing a section of the steeply sloping Bodegatan in Stockholm with an asphalt-rubber powder mixture. In Denmark two trial sections in Copenhagen are to be surfaced with a tar-rubber powder mixture, also with the aid of the Stichting; the aim here is to see whether the poor quality of Danish tar can be improved by the addition of rubber powder.

In Belgium the Rubber Stichting collaborated with the Antwerp Municipality in applying the Stichting's special joint filling asphalt rubber compound on a new section of an important thoroughfare.

And in Holland itself various new trials are under way.

Here mention may also be made of two recent applications of a material consisting of broken stone, asphalt, and rubber powder in surfacing storage spaces, in the one case on a ship's pier, and in the other on the premises of a large dealer in artificial fertilizers. The work in both cases was carried out by the Bredasche Asfaltfabriek "Haagh," N. V., of Breda.

Ozuriet and Drakaline Linings

The N. V. Hollandsche Draad & Kabelfabriek, Amsterdam, is marketing two new chemically resistant products, Ozuriet and Drakaline. Ozuriet is made of depolymerized natural rubber, fillers, sulfur, and accelerator in the form of sheets vulcanized to the surface to be protected. Natural rubber is milled with a suitable catalyst until it is a pasty mass having a molecular weight of 12,500 to 13,500. It is then removed from the mill, allowed to cool, compounded in the usual way, and calendered to sheets of 70 by 130 centimeters and 2-3 millimeters thick. The sheets can be applied to almost any surface, including glass, concrete, iron, wood, etc., with the aid of an adhesive, Wymasol, which is a liquid preparation similar to Ozuriet, and have been found to resist a number of chemicals, also at elevated temperatures; Ozuriet, it is reported, has withstood factory temperatures from 90 to 130° C. with marked success.

Drakaline is a dispersion of Ozuriet in benzine (gasoline) and is applied in successive coats by means of a brush or spray gun, chiefly as protection against gases and vapors, on surfaces not subject to mechanical strain or the action of solvents; it is also useful for parts which are too narrow to be lined with Ozuriet.

The idea of depolymerizing the rubber for the preparation of Ozuriet was suggested by the fact that, when aging, rubber first tends to soften and then gradually to harden, and it was concluded that by artifically inducing the softening process in unvulcanized rubber, a product might be obtained which, though still liable to age, would do so much more slowly than ordinary rubber. Aging is in fact said to proceed much more slowly in Ozuriet than in ordinary rubber; it is also stated that the product retains a degree of stretch that is adequate for a lining material.

Editor's Book Table

BOOK REVIEWS

"Elastomers and Plastomers; Their Chemistry, Physics and Technology. Volume III. Testing and Analysis; Tabulation of Properties." Edited by R. Houwink. Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 7 by 10 inches, 174 pages. Price $4.50.

This third volume concludes the series; Volume I covered "General Theory," and Volume II, "Manufacturing, Properties and Applications." This book comprises four chapters or sections besides an introduction by Dr. Houwink, Technical University, Delft, Holland. The first chapter, "Methods of Testing," by J. H. Teeple, Celanese Corp. of America, discusses the practical testing of physical, mechanical, electrical, and chemical properties, with a survey of methods used in different countries. Details of test methods are illustrated by photographs and tables, and a bibliography of 110 references is appended.

The next chapter, "The Chemical Analysis of Polymers," by A. G. Epprecht, Zurich, Switzerland, covers preparation for analysis, systematic analysis, additional specific tests, and quantitative analysis of individual polymers. The remaining chapters, "Properties of Elastomers," by B. B. S. T. Boonstra, Rubber Foundation, Delft, and "Properties of Plastomers," by J. W. F. van't Wout, Rubber Foundation, and Dr. Houwink, deal with standardization of materials in different countries and present extensive tabulations of properties. Under elastomers, detailed properties of 34 materials are tabulated, with a bibliography of 158 references. The section on plastomers covers 76 materials and has a table on properties of 17 fibers and a 72-item bibliography.

"Patent Law for the Executive and Engineer." Harry Aubrey Toulmin, Jr. Research Press, Inc., 137 N. Perry St., Dayton 2, O. Cloth, 5½ by 8 inches, 231 pages. Price $2.95.

This second edition has been completely revised and modernized in accordance with changes in the law. This book is a practical and handy volume designed to answer almost any question dealing with patents. The author, a patent counsellor for many leading corporations, has written an authoritative and readable book based on his own practical experience. Chapter headings include how to get a valid patent; when to consult a patent attorney; trade secrets *versus* patents; how to keep invention records; patent purchase and license agreements; who owns the patent, the employer or the employe; how to stimulate invention by employes; how to avoid patent infringement; what are patents worth; patents in the income tax return; patent pools; why and when to patent abroad; special patent problems of the chemical industry; what can and cannot be patented; basic requirements of an invention to be patentable; how to determine when a development is an invention; foreign patent protection for American industry; and other topics.

"Handbook of Plastics." Second Edition. Herbert R. Simonds, Archie J. Weith, and M. H. Bigelow. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 10, N. Y. Cloth, 6¾ by 9 inches, 1,535 pages. Price $25.

This second edition of the "Handbook," approximately 50% larger than the original one, is in effect an entirely new book. The original text has been largely rewritten, and much new material added to bring the subject matter up to date. As it stands now, the book is an encyclopedia of the plastics industry and possesses the value inherent in such a work. It provides an excellent survey of plastic materials, properties, applications, and fabricating techniques. Although some errors and omissions may be noted in specific sections by authorities in those fields, the usefulness of the book to provide a background on all facets of the plastics industry must be emphasized.

A review of chapter headings will best illustrate the coverage of the book: survey of the industry; properties of plastics; commercial materials; primary ingredients; characteristics of the various plastics; textile fibers; rubbers and elastomers; natural resins; films and sheetings; laminates and plywoods; coatings; adhesives; manufacturing processes; plant equipment; processing and fabricating; finishing operations; molds; the chemistry of plastics; analytical methods; applications; designing molded parts; operating practice; choice of plastic; cost accounting in the industry; patents in plastics; and world plastics. The text is amplified by the inclusion of 297 tables and 328 illustrations, and appendices include a selection of useful tables, a lengthy list of trade marks and names, both general and chemical glossaries, a bibliography, and a comprehensive index.

NEW PUBLICATIONS

"Mono-tert-Butyl-meta-Cresol." Technical Bulletin C-9-130. Koppers Co., Inc., Pittsburgh 19, Pa. 24 pages. This bulletin provides detailed information on the physical and chemical properties, chemical reactions, and uses of mono-tert-butyl-meta-cresol, a liquid alkylated phenol. Uses include application as an intermediate in the production of rubber chemicals and as a modifying agent in the preparation of synthetic resins. A bibliography of 83 references is included.

"The Trilogy of American Conservation, and the Eternal Question." R. S. Wilson. Goodyear Tire & Rubber Co., Akron, O. 24 pages. This booklet comprises two talks on soil conservation given by Goodyear Vice President R. S. Wilson. "The Eternal Question" was given before the American Society of Soil Conservation on December 9, 1948; while "The Trilogy of American Conservation" was presented before the National Association of Soil Conservation Districts on February 15, 1949.

"Paracril 26NS90 Compounds—Mechanical Goods Type." Enjay Co., Inc., 15 W. 51st St., New York 19, N. Y. 9 pages. Physical test results are tabulated for a series of mechanical goods compounds in both the original state and after various types of aging. Variations in plasticizer and carbon black contents of the compounds are given, and the stocks are arranged in 40, 50, 60, and 60 durometer hardness groups.

"Meet United Engineering and Foundry Company." United Engineering & Foundry Co., 948 Duquesne Way, Pittsburgh 22, Pa. 34 pages. Intended to acquaint employes with the company's history and policies, this booklet illustrates and describes the company's different plants and their products and presents information on employe policies and benefits.

"Kralac A. A High Styrene Copolymer." Compounding Research Report No. 11. Naugatuck Chemical Division, United States Rubber Co., Rockefeller Center, New York 20, N. Y. 20 pages. Kralac A, a high styrene copolymer with butadiene, is described in this report, which presents information on the properties of the resin, its processing and compounding techniques, and formulations and test data on use of the material in various types of natural and synthetic rubber stocks.

"Philblack O and Philblack A in Natural and Synthetic Rubber." Bulletin 100. Phillips Chemical Co., Bartlesville, Okla. 40 pages. This handsome booklet, illustrated with photographs and multi-color graphs, gives the properties of the Philblacks and results obtained in various rubbers in comparison with other carbon blacks. Philblack O is compared with EPC, MPC, and EPC blacks in GR-S, natural rubber, and natural rubber treads, respectively; Philblack A is compared with zinc oxide in carcass stocks, and with other blacks in GR-S and natural rubber-reclaim treads; and results are given on use of Philblacks O and A in natural rubber tread and inner tube stocks, Butyl rubber, and in "cold rubber" tread stocks.

"Silvacon for the Rubber Industry." Bulletin 150. Silvacon Sales, Weyerhaeuser Timber Co., Longview, Wash. 4 pages. The applications of Silvacon fractionated bark products in the rubber industry are described, with a listing of principal uses and their advantages. A tabulation of properties of Silvacon fibers and powders also appears.

"Chicago Rubber Group Yearbook, 1949." Chicago Rubber Group, Morrison Hotel, Chicago, Ill. 72 pages. This handsomely bound and illustrated yearbook gives a brief history of the Group, its chairmen, by-laws, executive committee, and yearbook staff; reviews of meetings during the 1948-49 season; directories of members and manufacturers in the Chicago area; and reference tables, including temperature and hardness conversions, carbon black types, capacities of hydraulic rams, and properties of synthetic rubbers.

"Dynalog Electronic Instruments." Bulletin 427. Foxboro Co., Foxboro, Mass. 32 pages. A detailed description is given of the principle of operation of Dynalog instruments, and models available for indicating, recording, and controlling voltage, pH, conductivity, temperature, resistance, and other variables.

Publications of Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. **"Higher Diols."** Form 6719. 8 pages. The properties and uses of eight new glycols are described in this booklet. Uses, tabulated by product and industry, include solvents, humectants, plasticizers, and intermediates for the production of certain resins and elastomers. **"Ucon Brand Fluids and Lubricants."** Form 6500B. 28 pages. The various types of "Ucon" polyalkylene glycol lubricants and their uses in lubrication of machinery are described. Information is also given on use of the fluids as rubber lubricants and lubricants for rubber-working machinery.

"Loss Prevention Bulletin." No. 2.80, January, 1949. Associated Factory Mutual Fire Insurance Cos., 184 High St., Boston 10, Mass. **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials."** April, 1949. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago 11, Ill. 80 pages. **"Resinoid Bonded Diamond Wheels."** Raybestos-Manhattan, Inc., Passaic, N. J. 36 pages. **"Keckley Steam and Liquid Control Equipment."** Catalog No. 49. O. C. Keckley Co., Chicago 6, Ill. 62 pages. **"Studies on Storage Life of Adhesives. I."** D. Narayanamurti and J. Pande. Indian Forest Leaflet No. 99 (1948). Forest Research Institute, Dehra Dun. 2 pages. **"Consulting Services."** Twelfth Edition, 1949. Association of Consulting Chemists & Chemical Engineers, Inc., New York 17, N. Y. 122 pages. **"Better Basketball."** Harry Rice, Pennsylvania Rubber Co., Jeannette, Pa. 32 pages. Price 25¢. **"Books and Periodicals Catalog, 1949."** Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. 63 pages.

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GR-S and Natural Rubber

(*Continued from page* 465)

GR-S made at 41° F. (X-435 and X-485) plasticized by Pepton 22 appears to require less accelerator than when no Pepton 22 is used with the same hot mastication. However, when properly cured with reduced accelerator concentrations, the GR-S made at 41° F. containing the catalytic plasticizer gives evidence of improved cut-growth resistance after heat aging.

Good-quality natural rubber may be prepared at the plantation with the desired amount of Pepton 22, shipped, and stored with no evidence of softening until it is subjected to hot mastication.

Acknowledgment

The authors acknowledge and express appreciation for the cooperation of the Copolymer Corp. in supplying samples of the GR-S latex made at 41° F. as well as samples of the dry polymers prepared with and without the plasticizer for use in our work. We appreciate the cooperation of the East Asiatic Co. Rubber Estates and of the United States Rubber Co. in making available samples of smoked sheets containing Pepton 22. We also express appreciation to the American Cyanamid Co. for permission to publish this paper.

Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	April 30	May 28	June 4	June 11	June 18	June 25
No. 1 Contract						
Aug.	18.06	16.68	16.10	16.31	16.22	16.40
Oct.	17.86	16.58	16.02	16.17	16.14	16.30
Dec.	17.70	16.50	15.96	16.05	16.00	16.20
Feb.	17.53	16.40	15.89	15.92	15.83	15.97
Apr.	17.40	16.30	15.80	15.80	15.70	15.80
June	17.30	16.20	15.70	15.70	15.60	15.70
Total weekly sales, tons	4,120	5,760	4,900	4,660	4,580	3,470

TRADING was featureless on the Commodity Exchange during June as rubber futures prices fluctuated irregularly through a relatively narrow range. The factors causing the sharp declines in May appeared to have run their course with no further damage, and prices were somewhat firmer. Some strength was reported in the London market with the news that a Rubber Trade Association committee there has negotiated with ECA representatives and approved a special contract which will permit purchases with ECA sterling counterpart funds.

The domestic futures market appeared to be awaiting resumption of government stockpile purchases, with almost daily rumors of such resumption causing sharp reactions on the Exchange. Trading volume was at the highest level for the year, but a good part of this trading represented switching operations from the July and September contracts into the December contract.

In the No. 1 Contract, August futures opened the month at the low of 15.90¢, moved erratically for the next few days, then rose to fluctuate in the 16.17-16.57¢ range, and closed at 16.30¢ on June 30. Other futures showed similar movement; December contracts started the month at 15.75¢, reached a high of 16.35¢ on June 9, and closed the month at 16.10¢. Total volume of sales was 21,680 tons, as compared with 13,520 tons during May.

New York Outside Market

WEEK-END CLOSING PRICES

	April 30	May 28	June 4	June 11	June 18	June 25
No. 1 R.S.S.						
June	18.38	16.75	16.25	16.38	16.38	16.50
July-Sept.	18.25	16.75	16.25	16.38	16.38	16.50
Oct.-Dec..	18.13	16.75	16.25	16.25	16.25	16.38
No. 3 R.S.S	16.75	15.38	14.75	14.88	14.50	14.88
No. 2 Brown	15.00	15.00	14.50	14.63	14.25	14.50
Flat Bark .	12.25	12.00	11.63	12.13	12.00	12.00

RUBBER trading on the New York Outside Market was quiet during June as dealers continued to await the resumption of government stockpile buying. Except for a very high level of tire sales during the summer, stockpile purchasing appeared to offer the only hope for market activity in view of large stocks on hand and continuation of cautious buying policies by consumers.

Stockpiling purchases were awaiting only the President's signature to the Second Deficiency bill, which includes appropriations for such purchases before June 30. The bill for stockpiling in the fiscal year 1950, amounting to $775,000,000, cleared joint Senate-House conferences, passed the House, and was awaiting Senate floor action. The Munitions Board was reported ready to spend $40,000,000 on strategic materials before June 30, and an additional $270,000,000 for contracts applicable to the fiscal year 1949.

The spot price for No. 1 R.S.S. began the month at 16.13¢, dipped to a low of 16.00¢ on June 7, and moved in the 16.25-16.63¢ range during the balance of the month, closing at 16.38¢ on June 30. Starting at 14.50¢ on June 1, No. 3 R.S.S. prices fell to a low of 14.25¢ on June 14, then fluctuated in the 14.50-15.00¢ range during the remainder of the month. No. 2 Brown moved in the 14.13-14.63¢ range during June; while Flat Bark hovered between 11.50¢ and 12.25¢.

Latices

THE quality of *Hevea* latex continues high, and, with the liquidation of a few small stocks imported some time ago, stocks on hand should be capable of being stored without serious quality degradation, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's June *Rubber Report*. *Hevea* latex remained firm at the 25.5-28.5¢ level despite the decline in crude rubber prices.

April imports of *Hevea* latex are estimated at 2,271 long tons; consumption, 2,880 long tons; and month-end stocks, 9,220 long tons. As with the preceding few months, receipts during April were lower than consumption, continuing the efforts to reduce stocks. Outlook for increasing use of *Hevea* latex in foam sponge is still favorable, and additional use is expected in tires.

Estimated production of GR-S latex during April was 1,326 long tons, dry weight, a decline from the March level. Tire fabric treatments, adhesives, and paper saturants are said to account for the bulk of GR-S latex used. Bulk prices of GR-S latex remained unchanged at 18.5-20.25¢ a pound.

RECLAIMED RUBBER

SALES of reclaimed rubber during June declined about 7% from the May level, with the major factors appearing to be the low crude rubber price level, and consequent competition of crude with reclaimed rubber, and the generally dull business conditions prevailing in the rubber industry. With the summer vacation period at hand, no marked improvement is expected until the fall.

Final March and preliminary April statistics on the domestic reclaimed rubber industry are now available. In March, production totaled 19,991 long tons; consumption, 19,508 long tons; exports, 1,054 long tons; and month-end stocks, 33,397 tons. Preliminary figures for April give a production of 18,442 long tons; consumption, 18,625 long tons; month-end stocks, 32,974 long tons; exports, 1,070 tons.

No changes in reclaimed rubber prices occurred in June; current prices are:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8.5 / 9
Peel	1.18-1.20	8.5 / 9.5
Inner tube		
Black	1.20-1.22	12.75/13.75
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

FURTHER slackening in the already dull scrap rubber market was noted last month. A rather slow summer period is expected, with no pickup in demand until the late fall, and more emphasis is expected to be placed on export business. Movement of scrap tubes also slowed down in June, but some export demand for red auto tubes at 6.5¢ a pound was noted.

Export business is still not very extensive. Some inquiries were received as a result of the ECA order setting aside $400,000 for shipment of tubes to western Germany. Some inquiries from Spain were also reported, but traders state that business with Spain is difficult in view of the strained political situation. It was indicated, however, that some scrap rubber is reaching Spain through other countries.

No changes in domestic scrap rubber prices were made during June. Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$12.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	4.00	4.00
Red passenger tubes	7.50	7.50

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	April 30	May 28	June 4	June 11	June 18	June 25
Oct......	29.16	28.97	28.86	29.16	29.36	29.38
Dec......	28.94	28.79	28.66	28.95	29.12	29.26
Mar......	28.85	28.66	28.56	28.83	29 07	29.14
May......	28.66	28.18	28.40	28.65	28.91	29.04
July.....	27.89	27.72	27.67	27.72	28.16	28.43
Oct......	26.07	25.54	25.25	25.03	25.52	26.08

PRICES moved upward on the New York Cotton Exchange during June after a slow start. June and July, the last of the old crop months, advanced under active short covering by leading spot interests. New crop positions, with interest centered in the October delivery, also rose in the face of continued reports of boll weevil depredations in the Cotton Belt; covering by spot firms against October purchases by ECA nations for third-quarter delivery; and a growing belief that parity will not drop much, if at all, before July 15 when the new loan rate will be established.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

Effective July 1, 1947

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.	**Address All Replies to New York Office at 386 Fourth Avenue, New York 16, N. Y.**	*Letter replies forwarded without charge, but no packages or samples.*

SITUATIONS WANTED

PRODUCTION-DEVELOPMENT-ENGINEERING-COMPOUNDER having over 20 years of broad practical experience in all phases of manufactures of mechanical and sponge rubber products, wants new location in Western U. S. Manufacturing knowledge received in large and small plants. Address Box No. 392, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—PRODUCTION SUPERINTENDENT FOR insulated wire. B.S., 1931. Some experience in molded goods. Several years as chemist in coal-tar and pitch plant. Good trouble-shooter. Reliable. Efficient. Successful in handling help. Interested in small or medium sized plant in a supervisory or control capacity. Available immediately. Address Box No. 395, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES WANTED

WANTED: TWO 40", 30" RAM, SLAB SIDED, FOUR-OPENING hydraulic presses. Address Box No. 387, care of INDIA RUBBER WORLD.

WANTED: COMPLETE RUBBER PLANTS. ALSO INDIVIDUAL items such as 2-roll mills, calenders, mixers and Banbury mixers. Address Box No. 390, care of INDIA RUBBER WORLD.

WANTED: 60-INCH CALENDAR WITH DRIVE. EITHER THREE-roll or "Z" type. Must be of recent construction. Address Box No. 391, care of INDIA RUBBER WORLD.

WANTED — Large engineering firm wishes to acquire several complete Rubber Plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible, strictest confidence. Box 1220, 1474 Broadway, New York 18, N. Y.

Compounding Facilities Available - - We invite your inquiries.

PEQUANOC RUBBER COMPANY

Main Street, Butler, N. J.

WANTED

Chemicals — Colors — Pigments
Resins — Solvents — Glues — Plasticizers
Other Raw Materials

CHEMICAL SERVICE CORPORATION

80 Beaver Street, New York 5 — Hanover 2-6970

SITUATIONS OPEN

WANTED—SALES REPRESENTATION BY ESTABLISHED RUBber manufacturer selling all types of industrial rubber products, molded rubber-to-metal adhesion, rolls and rollers, tank lining, pulley lagging, etc. Commission basis. Prefer men now contacting industrial trade with allied lines. Territories open: Northern Ohio, Pennsylvania, New York, New England, Maryland, West Virginia, Southern Ohio, and Southern Illinois. Address Box No. 385, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES FOR SALE

FOR SALE: 1—WATSON STILLMAN LOW AND HIGH HYDRO Pneumatic Accumulator (3000#) pressure with pumps, motors, and accessories. 1—48 x 48" 3-opening Hydraulic Press with 4-16" rams; other presses, various sizes. 1—6' x 24' Vulcanizer, 100# pressure, quick-opening door—Royle and other Tubers 2$\frac{1}{8}$ to 8". Also mills, calenders, etc. Send us your inquiries. CONSOLIDATED PRODUCTS CO., INC., 13-16 PARK ROW, NEW YORK 7, NEW YORK. Telephone BArclay 7-0600.

PLASTICS EXTRUDERS

For Sale

One 3$\frac{1}{4}$" Hartig and one 2$\frac{1}{2}$" National: oil heated: now in operation in Advertiser's plant. Address Box No. 394, care of INDIA RUBBER WORLD.

FOR SALE:

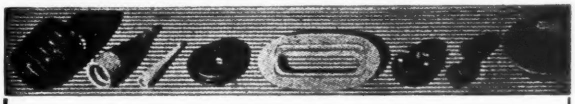
Pure gum surgeons' glove plant completely equipped to turn out 2,000 pairs per day. Operating steadily with ample labor supply. Midwest location.

Address Box No. 383, care of India RUBBER WORLD

WANTED

RUBBER PRODUCTS PATENTS desired; large national mechanical Manufacturer: confidential. Complete details first letter.

Address Box No. 341, care of INDIA RUBBER WORLD.



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FROM NATURAL, RECLAIMED, AND SYNTHETIC RUBBER

THE BARR RUBBER PRODUCTS CO. SANDUSKY OHIO

REPRINTS OF

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INDIA RUBBER WORLD

386 FOURTH AVE. NEW YORK 16

(Classified Advertisements Continued on Page 519)

The 15/16-inch middling spot price began the month at 33.41¢, fell to a low of 33.12¢ on June 27, after having reached a high of 33.80¢ on June 22, and closed the month at 33.41¢. October futures started at 28.79¢ on June 1, rose to a high of 29.49¢ on June 20, then fell off somewhat in a wave of profit taking, but closed the month at 29.49¢ again.

Fabrics

Manufacturers of cotton chafer fabrics believe that cotton yarns will dominate the chafer field for a long time to come. Despite the sharp trend away from cotton tire cord yarns shown in the Bureau of Census report early in June, it was said that tire producers prefer cotton in chafer fabrics for reasons of economy and because tire chafers do not require the higher tensile strengths needed for tire cord. Extensive research in other yarns for use in hose and belting has also been conducted, but here too the prediction was that, with minor exceptions, cotton will continue to dominate the picture.

Heavy demand by the coating trade for wide drills and sateens featured an otherwise dull industrial fabrics market during June. Although some large orders were placed for various wide ducks, the general tone of business in these constructions was subdued. Hose and belting ducks moved slowly at unchanged prices, with only small orders being placed. Chafers were reported to be dull and quoted at nominal prices. Loomage on osnaburgs is said to be down to the lowest level in several years, and the large inventories built up earlier this year are being gradually worked off in the face of continuing small orders. Only quiet trading was reported in both print cloths and sheetings.

Current prices for cotton fabrics follow:

Cotton Fabrics

Drills		
59-inch 1.85-yd	yd.	$0.37
2.25-yd		.33
Ducks		
38-inch 1.84-yd. S. F.	yd.	.425
2.00-yd. D. F.		.31/.325
51.5-inch 1.35-yd. S. F.		.52
66-inch 1.02-yd. S.F		.73
Hose and belting		.62
Osnaburgs		
40-inch 3.65-yd	yd.	.1325/.135
Raincoat Fabrics		
Bombazine, 64 x 60 5.35-yd.	yd.	.1825
Print cloth, 38½-inch, 64 x 60		.1263
Sheeting, 48-inch, 4.17-yd.		.23
52-inch3.85-yd		.2488
Chafer Fabrics		
14-oz./sq. yd. Pl.	lb.	.66
11-65-oz./sq. yd. S		.60
10-80-oz./sq. yd. S.		.62
8.9-oz./sq. yd. S.		.65
14-oz./sq. yd. S.		.59
Other Fabrics		
Headlining, 59-inch 1.35-yd, 2-ply	yd.	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.57
58-inch 1.21-yd		.6238
Tire Cords		
K. P. std., 12-3-3	lb.	.73
12-4-2		.72

RAYON

WORLD production of rayon filament yarn and staple during 1948 totaled 2,477,475,000 pounds, an increase of 23% over 1947 output and only 12% below the 1941 all-time high. World production of rayon filament yarn reached 1,557,290,000 pounds, a new high and 18% above 1947 figures. Of this total, the United States produced 856,150,000 pounds, or 55% of all filament yarn made.

The combined world production of rayon, cotton, wool, and silk in 1948 amounted to 17,813,000,000 pounds, an increase of 17% over the previous year's output. Cotton continued to be the most important of the four fibers in terms of quantity produced, amounting to 73% of the total, followed by rayon with 14%, wool with 13%, and silk nominal. In 1938 the proportional distribution of these fibers was: cotton, 75%; wool, 13%; rayon, 11%; and silk, 1%.

Following the price reductions in high-tenacity viscose tire yarns and fabrics announced in May, similar reductions were subsequently announced by other producers, and current prices are listed below:

Rayon Fabrics

Tire Yarns			
1100/480	$0.55		
1100/490	.55		
1150/490	.55		
1650/720	.54		
1650/980	.54		
1900/980	.54		
2200/960	.53		
2200/980	.53		
4400/2934	.55	/	.56
Tire Fabrics:			
1100/490/2	.67		
1650/980/2	.645	/	.66
2200/980/2	.63		

Compounding Ingredients Price Changes and Additions

Colors—White				
Zinc oxide				
Azo ZZZ-11, -44, -55	lb.	$0.10	/	$0.1025
-66	lb.	.1225	/	.125
35% leaded	lb.	.11⅛	/	.11⅜
Eagle AAA, lead free	lb.	.10	/	.1025
5% leaded	lb.	.10	/	.1025
35% leaded	lb.	.11⅛	/	.11⅜
50% leaded	lb.	.11⅝	/	.11⅞
Florence Green Seal	lb.	.1175	/	.12
Red Seal	lb.	.1125	/	.115
White Seal	lb.	.1225	/	.125
Horsehead XX-4, -78	lb.	.10	/	.1025
Kadox-15, -17, -72	lb.	.10	/	.1025
-25	lb.	.1225	/	.125
Lehigh, 35% leaded	lb.	.11⅛	/	.11⅜
50% leaded	lb.	.11⅝	/	.11⅞
Protox-166	lb.	.10	/	.1025
Standard, 5% leaded	lb.	.10	/	.1025
Mold Lubricants				
DC Mold Release Fluid Emulsion #35	lb.	1.84	/	3.50
Plasticizers and Softeners				
Bardol	lb.	.025	/	.035
B	lb.	.055	/	.0575
639	lb.	.025	/	.0425
BRC 20	lb.	.0125	/	.0135
30	lb.	.011	/	.0195
521	lb.	.0175	/	.0185
BRS 700	lb.	.02	/	.026
Carbonex	lb.	.0325	/	.0375
644	lb.	.0375	/	.0425
645	lb.	.036	/	.0385
Pigmentar	lb.	3.69	/	4.70
Pigmentaroil	lb.	3.69	/	4.70
Synthol	lb.	.205		
Reclaiming Oils				
#3186 Reclaiming Oil	gal.	.28	/	.295
Heavy Resin Oil	lb.	.0225	/	.0375
Reinforcers, Other Than Carbon Black				
BRC 20	lb.	.0125	/	.0135
30	lb.	.011	/	.0195
Carbonex	lb.	.0325	/	.0375
644	lb.	.0375	/	.0425
645	lb.	.036	/	.0385

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	
15" & 16" D. C. Passenger	May, 1949
16x4.00E	199,470
16x4.50E	101,919
16x5.00F	15,633
15x5.50F	3,862
16x5.50F	7,712
16x6.00F	5,360
16x4.00E—Hump	27,753
16x4.50E—Hump	29,407
15x4½-K	45,221
16x4½-K	54,573
15x5-K	570,943
16x5-K	10,558
15x5½-K	384,169
15x6-L	104,908
16x6-L	14,650
15x6½-L	176,526
15x4½-K—Hump	337,983
15x5-K—Hump	104,154
15x5½-K—Hump	114,400
15x6-L—Hump	26,436
17" & Over	
17x3.62	737
18x2.00BB	1,470
Truck-Bus	
17x5.0	17,521
18x5.0	19,398
20x5.0	24,336
17x5.00R	16,980
15x5.00S	165
20x5.00S	11,200
17x5.5	20,189
15x5.50S	1,514
20x5.50S	1,843
20x6.0	71,528
20x6.00S	19,435
20x6.00T	440
20x6.50T	14,784
20x7.0	2,001
22x7.0	370
20x7.33V	616
20x7.5	6,328
22x7.5	3,883
20x7.50V—Flat Base	1,618
22x7.50V—Flat Base	2,628
20x8.00V	852
20x8.37V	23
24x8.37V	1,208
24x9.00V	150
20x10.0	2,426
Semi D. C.	
16x4.50E	6,922
15x5.50F	65,390
16x5.50F	33,765
16x6.50H	12,187
Tractor & Implement	
12x3.00D	10,289
15x3.00D	33,085
16x3.00D	8,778
18x3.00D	6,005
19x3.00D	8,529
21x3.00D	124
24x3.00D	1,162
36x3.00D	4,736
20x4.50E	2,683
36x4.50E	700
18x5.50F	13,178
20x5.50F	3,706
20x8.00T—S. D. C.	277
24x8.00T	230
24x8.00T—S. D. C.	4,829
28x8.00T	154
28x8.00T—S. D. C.	308
36x8.00T	352
38x8.00T	165
W5-30	2,605
W7-24	13,689
W7-32	812
W8-24	4,003
W8H-24	7,600
W8-32	714
W8-34	3,096
W9-24	5,192
W9-28	18,102
W9-38	3,894
W10H-24	509
W10-28	4,638
W10-38	3,477
W13-26	2,394
W13-28	802
DW8-38	198
DW9-38	5,158
DW10-26	283
DW10-38	9,390
DW11-24	8
DW11-26	860
DW11-28	541
DW11-32	557
DW11-38	7,825
DW12-26	1,553
DW12-30	3,803
DW12-34	2,019
DW14-30	2,140
DW16-26	653
Earth Mover	
20x11.25	69
24x11.25	103
24x13.00	133
32x13.00	58
24x15.00	149
25x15.00	178
25x17.00	31
29x17.00	335
Industrial	
8x2.50C	37
9x4.00E	19
12x5.00S	1,146
TOTAL	2,905,607

United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

Exports of Domestic Merchandise

	March, 1949 Quantity	March, 1949 Value
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	231,730	$116,911
Balata	478	1,521
Synthetic rubber: GR-S	420,465	96,020
Butyl	2,869	910
Neoprene	1,033,053	363,331
Nitrile	700,195	317,050
"Thiokol"	5,450	3,379
Polyisobutylene	22,284	7,137
Reclaimed rubber	2,360,719	181,547
Scrap rubber	3,122,925	99,351
TOTALS	7,900,168	$1,187,157
MANUFACTURED		
Rubber cement ... gals.	41,453	$72,930
Rubberized fabric: auto cloth ... sq. yds.	45,928	37,530
Piece goods and hospital sheeting ... sq. yds.	65,041	44,250
Rubber footwear:		
Boots ... prs.	15,981	74,066
Shoes ... prs.	15,820	26,006
Rubber-soled canvas shoes ... prs.	80,737	121,627
Soles ... doz. prs.	20,024	62,726
Heels ... doz. prs.	52,366	49,082
Rubber soling and top-lift sheets ... lbs.	63,944	14,240
Gloves and mittens ... doz. pr.	13,076	45,688
Drug sundries: water bottles ... no.	23,185	16,647
Other		407,025
Rubber and rubberized clothing	.....	121,332
Balloons	.....	37,345
Rubber toys and balls		14,711
Erasers ... lbs.	14,344	12,909
Hard rubber goods:		
Battery boxes ... no.	37,997	49,061
Other electrical goods ... lbs.	307,567	119,751
Combs, finished ... doz.	10,204	12,394
Other	.....	4,265
Tire casings: truck and bus ... no.	95,774	3,890,942
Auto ... no.	38,005	521,462
Farm tractors, etc ... no.	26,690	757,863
Other-off-the-road ... no.	3,368	335,943
Tires and casings:		
Aircraft ... no.	4,070	167,870
Bicycle ... no.	12,654	13,827
Motorcycle ... no.	1,239	3,813
Other ... no.	4,062	26,946
Inner tubes: auto, bus, truck ... no.	95,304	319,997
Other ... no.	24,686	98,507
Solid tires: truck and industrial ... no.	4,714	202,148
Other ... lbs.	7,702	3,989
Tire repair materials: camelback ... lbs.	87,185	25,363
Other ... lbs.	113,922	60,864
Rubber and friction tape ... lbs.	37,940	28,674
Belting: auto and home ... lbs.	123,430	142,970
Transmission:		
V-Belts ... lbs.	125,962	216,379
Flat belts ... lbs.	65,919	71,767
Other ... lbs.	94,988	88,867
Conveyer and levitator ... lbs.	111,745	87,171
Other ... lbs.	139,189	117,881
Hose and tubing ... lbs.	624,235	449,966
Rubber packing ... lbs.	141,408	130,574
Mats, flooring, tiling ... lbs.	801,351	207,418
Rubber thread: bare ... lbs.	32,571	50,789
Textile covered ... lbs.	17,952	52,052
Guttar perha manufactures ... lbs.	7,494	9,342
Latex and other compounded rubber for further manufacture ... lbs.	318 890	139,542
Other natural and synthetic rubber products	.....	354,922
TOTALS	.....	$9,921,433
GRAND TOTALS, ALL RUBBER EXPORTS	.....	$11,108,590

Reexports of Foreign Merchandise

	Quantity	Value
UNMANUFACTURED, Lbs.		
Crude rubber	1,259,334	$245,780
TOTALS	1,259,334	$245,780
MANUFACTURED		
Rubber toys and balls	.....	$1,785
Tire casings: auto ... no.	5	213
Hose and tubing ... lbs.	1,290	461
Rubber packing ... lbs.	992	597
Other natural and synthetic rubber manufactures	.....	115
TOTALS	.....	$3,171
GRAND TOTALS, ALL RUBBER REEXPORTS	.....	$248,951

Imports for Consumption of Crude and Manufactured Rubber

	March, 1949 Quantity	March, 1949 Value
UNMANUFACTURED, Lbs.		
Crude rubber	120,440,566	$20,095,422
Rubber latex	6,291,371	1,564,383
Balata	303,791	86,499
Jelutong, or Pontianak	134,584	52,313
Gutta percha	11,200	30,967
Chicle	1,093,797	725,136
Synthetic rubber	3,215,583	577,045
Scrap rubber	1,294,345	37,246
TOTALS	132,785,257	$23,169,011
MANUFACTURED		
Tires: auto, bus, truck ... no.	313	$3,431
Bicycle ... no.	260	679
Other ... no.	1	11
Inner tubes: auto, etc ... no.	233	719
Rubber footwear: shoes and overshoes ... prs.	107	188
Rubber-soled canvas shoes ... prs.	17,060	18,989
Balls: golf ... no.	19,056	7,827
Tennis ... no.	1,440	482
Other athletic ... no.	267,760	31,559
Toys, except balloons	.....	7,468
Hard rubber goods, except combs	.....	471
Rubber and cotton packing ... lbs.	1,826	2,793
Gaskets and valve packing	.....	219
Belting ... lbs.	8,795	13,412
Hose and tubing	.....	672
Rubber instruments ... doz.	171	1,335
Bands ... lbs.	1,548	698
Soft rubber goods, except drug sundries	.....	13,201
Synthetic rubber products	.....	209
Other rubber goods	.....	658
TOTALS	.....	$105,021
GRAND TOTALS, ALL RUBBER IMPORTS	.....	$23,274,032

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

Trade Marks

(Continued from page 502)

507,873. **Tru-Flite.** Basketballs, golf balls, footballs, etc. A. G. Spalding & Bros., Inc., Chicopee, Mass.

507,874. Representation of a tennis player standing on a ball. Tennis balls and squash balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

507,880. **Roger (O. K.)** Prophylactic articles. Roger Rubber Products, Inc., Los Angeles, Calif.

507,883. **B-D.** Syringes and parts thereof. Becton Dickinson & Co., Rutherford, N. J.

507,884. **Ace.** Elastic bandages, etc. Becton Dickinson & Co., Rutherford, N. J.

507,885. **Asepto.** Syringes. Becton Dickinson & Co., Rutherford, N. J.

507,888. **Champion.** Syringes, milking tubes, etc. Becton Dickinson & Co., Rutherford, N. J.

507,903. **Laher.** Tires. Laher Spring & Tire Co., Chicago, Ill.

507,923. Representation of a winged foot and the word: **"Goodyear."** Tire and tubes, repair kits, brake lining, etc. Goodyear Tire & Rubber Co., Akron, O.

507,945. **Kismet.** Tire pressure gage. W. Turner (Kismet) Ltd., Sheffield, England.

507,954. **Velon.** Plastic vehicle seat covers. Firestone Tire & Rubber Co., Akron, O.

507,984. **Speedway.** Tires, tubes, hose, and belting. Goodyear Tire & Rubber Co., Akron, O.

507,986. **Weldstitch.** Tubes. General Tire & Rubber Co., Akron, O.

507,989. **Airflo Chief.** Tires and tubes. Mohawk Rubber Co., Akron, O.

507,990. **Big Chief.** Tires and tubes. Mohawk Rubber Co., Akron, O.

508,018. **Selectroule.** Instruments for measuring belts. Goodyear Tire & Rubber Co., Akron, O.

508,028. **Danolite.** Slabs and sheets of rubber. Danbury Rubber Co., Inc., Danbury, Conn.

508,032. **Wadewell.** Footwear. Hodgman Rubber Co., Framingham, Mass.

508,040. **Cedar Post.** Footwear. Endicott Johnson Corp., Endicott, N. Y.

508,075. **Corsees.** Girdles, corsets, and brassieres. Artistic Foundations, Inc., New York, N. Y.

508,103. **Fuse.** Patches and packing for tires and tubes, tire sections, tire boots, etc. Inland Rubber Corp., Chicago, Ill.

508,173. **Jr. Town.** Bathing caps and suits. Arkwright Merchandising Corp., New York, N. Y.

508,182. **Featherglass.** Sheet or roll plastic film. Transolene Corp., doing business as Transolene Co., Barrington, Ill.

508,251. **Vamos.** Elastic fabric and webbing. Alfred Vamos, Inc., New York, N. Y.

508,258. Representation of an oval containing the words: **"Du Pont."** Plasticoated fabrics and film. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

508,259. Representation of a rectangle containing two rectangles and the words: **"first flex."** Stretchable fabrics. Native Laces & Textiles, Inc., New York, N. Y.

508,264. **Px.** Plastic impregnated fabrics. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

508,293. Representation of a pair of skis and the words: **"Original Lake Placid Boot."** Footwear. Consolidated Footwear Corp., New York, N. Y.

508,305. **Baldwin Supertex.** Belting. Baldwin Belting, Inc., New York N. Y.

508,322. **Dottie Born.** Footwear. Born Shoe Co., Granite City, Ill.

508,356. **Carlisle.** Tires and tubes. Pharis Tire & Rubber Co., Newark, O., assignee of Carlisle Tire & Rubber Co.

508,377. **President.** Tires. United States Rubber Co., New York, N. Y.

508,422. **Inland.** Rubber cleaners and solvents. Inland Rubber Corp., Chicago, Ill.

508,432. **Wilbow.** Plumbing specialties. Williams-Bowman Rubber Co., Cicero, Ill.

508,478. **DC-4.** Golf balls. Endicott Johnson Corp., Endicott, N. Y.

508,478. Representation of a geometric figure containing the word: **"Oreal."** Floor mats. Ohio Rubber Co., Willoughby O.

508,489. **Non-slip.** Prophylactic Articles. Julius Schmid, Inc., New York, N. Y.

508,490. Representation of a lynx and the word: **"Lynx."** Prophylactic articles. Julius Schmid, Inc., New York, N. Y.

508,510. The word: **"Speeder"** between two lines. Belting. Hettrick Mfg. Co., Toledo, O.

508,511. **Hetmaco.** Belting. Hettrick Mfg. Co., Toledo, O.

508,520. **Union.** Tires and tubes. Columbia Sales Corp., Pittsburgh, Pa.

United States Rubber Statistics—March, 1949

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month-End
	Production	Imports	Total	Consumption	Exports	Stocks
Natural rubber, total	0	53,768	53,768	49,665	562	107,979
Natural latex, total	0	2,809	2,809	3,443	0	9,685
Natural rubber and latex, total	0	56,577	56,577	53,108	562	117,664
Synthetic rubber, total	*31,939 † 4,124	1,436	37,499	38,746	963	116,860
GR-S	*26,704 † 311	1,309	28,324	29,793	188	‡97,742
Neoprene	† 2,940	0	2,940	3,054	461	4,508
Butyl	* 5,235	127	5,362	5,358	1	12,054
Nitrile	† 873	0	873	541	313	2,556
Natural rubber and latex, and synthetic rubber, total	36,063	58,013	94,076	91,854	1,525	234,524
Reclaimed rubber, total	19,991	0	19,991	19,508	1,054	33,397
GRAND TOTALS	56,054	58,013	114,067	111,362	2,579	267,921

*Government plant production.
†Private plant production.
‡Includes 17 tons shipped for export, but not cleared.
SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY & SUPPLIES FOR SALE (Cont'd)

FOR SALE: FARREL 18" X 45", 16" X 48", 15" X 36" 2-ROLL RUBber Mills, also new Lab. 6" x 12" & other sizes up to 84": Rubber Calenders: Extruders 2" to 6"; Ball & Jewell Rotary Cutters 40 HP & 5 HP; Baker Perkins 200 gal. & 100 gal. double arm, jack. Mixers, also 9 and lab. 0.7 gals.: Large stock Hydraulic Presses from 12" x 12" to 42" x 48" platens, from 50 to 1500 tons: Hydraulic Pumps & Accumulators: Injection Molding Machines 1 to 16 oz.: Stokes & Colton single punch & rotary preform Tablet Machines, ½" to 2½"; Banbury Mixer; Grinders & Crushers, etc. SEND FOR SPECIAL BULLETIN. WE BUY YOUR SURPLUS MACHINERY. STEIN EQUIPMENT COMPANY, 90 WEST STREET, NEW YORK 6, N. Y.

FOR SALE: DOUBLE-ARM JKTD. MIXERS: 15-GAL. B-P; 25-GAL. Day: 100-gal. W & P: 250-gal. Read. Stokes rotary 16-punch pellet presses. PERRY EQUIPMENT CORP., 1524 W. Thompson St., Phila., 21, Pa.

FOR SALE: TWO 36", 24" RAM, FOUR-OPENING, AND TWO 32", 24" ram, six-opening, hydraulic presses. Address Box No. 386, care of INDIA RUBBER WORLD.

FOR SALE: ONE HEAVY-DUTY 2-ROLL RUBBER MILL: FRONT roll 20" x 30" corrugated; back roll 24" x 30" corrugated with 14" diameter necks complete with bed plate. Sixty-HP motor included with reduction gear. Address Box No. 388, care of INDIA RUBBER WORLD.

FOR SALE: ONE 3-ROLL 20 X 60" CALENDER: TWO 60" MILLS: one 40" mill: one 26 x 84" mill; one 42" 8-opening hydraulic press, 24" diameter ram. Two 30 x 30 hydraulic presses: two 24 x 24 hydraulic presses: 4 spreaders; 10 200-gallon cement churns: two 40-gallon pony mixers: doubling calender: 2 embossing calenders; one can machine for doubling. Ten heel trimming machines: one 3A Banbury mixer: 3 100-gallon size W & P mixers. Address Box No. 389, care of INDIA RUBBER WORLD.

EQUIPMENT FOR SALE: 14 OIL HYDRAULIC UNITS 500# LOW 2000# Hi-Pressure Pumps 50 and 65 gal. reservoir, 5 to 10 H.P. Motors, complete with all operating valves. All in good operating condition. For use with rubber or plastic presses. YALE RUBBER MFG. CO., SANDUSKY, MICHIGAN.

BUSINESS OPPORTUNITY

LATEX FOAM PLANT WANTED
to mold quantities of a large sized item. Address Box No. 393, care of INDIA RUBBER WORLD.

Malayan Rubber Statistics

The following statistics for March and April, 1949, have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W. C. 2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

	Sheet and Crepe						Latex, Concentrated Latex, and Revertex (Dry Rubber Content)						
			Malayan Union						Malayan Union				
	Singapore Export Proper		Transshipped		Direct Shipments		Singapore Export Proper		Transshipped		Direct Shipments		Total All Grades Jan.-Apr., 1949
To	March	April	March	April	March	April	March	April	March	April	March	April	
Argentine Republic	...	...	25	...	...	...	4	...	...	...	...	...	125
Australia	956	757	25	56	390	49	35	12	47	26	6	...	5,933
Austria	...	...	...	...	...	...	...	...	...	...	...	...	5
Belgium	413	335	50	90	554	269	14	7	35	39	10	1	3,411
Bulgaria	...	...	...	...	...	...	...	...	...	...	...	...	342
Burma	...	...	...	...	...	...	...	...	...	...	...	...	2,423
Canada	649	915	241	...	1,620	941	3	...	...	...	...	85	11,338
Chile	82	161	50	...	317	59	...	...	...	...	...	...	718
China	1,599	615	...	50	353	70	...	...	...	...	...	...	3,288
Cuba	...	5	...	...	...	150	...	...	...	...	...	...	305
Cyprus	5	...	...	...	...	...	...	...	...	...	...	...	10
Czechoslovakia	870	5	100	...	423	...	...	...	...	...	...	...	1,603
Denmark	50	69	60	20	218	81	3	8	...	...	6	1	1,389
Egypt	16	11	6	...	...	...	...	...	...	3	...	...	71
Finland	...	190	...	126	15	23	...	...	...	...	...	...	354
Formosa	417	329	...	...	...	...	3	...	...	...	...	...	749
France	1,110	2.271	469	497	2,127	2,511	128	101	77	...	58	2	19,197
Germany	3,519	1,799	1,394	662	3,359	2,553	57	93	...	...	21	27	28,029
Greece	25	...	...	...	...	25	1	...	...	...	...	...	51
Hong Kong	524	268	20	10	306	230	...	1	...	...	...	...	2,993
Hungary	...	...	...	...	35	...	...	...	...	...	...	...	35
Italy	1,000	1,229	260	585	1,175	953	1	9	8	13	34	23	10,782
Japan	430	...	150	...	2,956	45	...	...	154	...	...	...	10,618
Korea	...	20	...	...	...	...	...	...	...	...	...	...	40
Mexico	296	200	...	...	350	332	...	...	3	...	...	...	2,042
Morocco	...	...	...	...	100	...	...	...	...	...	...	...	100
New Zealand	112	...	...	...	...	10	10	...	7	...	...	...	347
Netherlands	465	150	207	110	948	27	7	29	7	...	...	4	15,563
Norway	200	254	10	140	100	34	...	10	11	...	...	...	1,446
Other British countries in Africa	...	...	...	...	...	...	...	...	...	...	...	...	1
Countries in North America	3	3	...	...	...	...	...	...	...	...	...	...	8
South America	99	130	...	20	85	357	...	...	...	...	...	...	1,066
Pakistan	...	1	...	...	...	...	...	...	...	...	...	...	5
Peru	...	...	...	...	...	...	...	...	...	...	...	...	49
Philippine Islands	...	...	...	...	...	...	4	1	...	...	...	...	31
Poland	125	100	...	...	499	...	...	...	...	...	...	...	1,246
Portugal	...	...	...	...	177	...	1	...	...	...	...	...	587
Portuguese East Africa	...	...	...	...	...	...	...	...	...	...	...	...	5
Rumania	...	...	...	...	...	...	...	...	...	...	...	...	275
Russia	4,498	5,063	315	473	2,225	6,962	...	164	...	152	...	...	32,856
Spain	...	735	...	...	...	295	76	...	...	...	...	...	1,117
Sweden	620	780	96	195	430	860	30	11	43	11	3	5	4,352
Switzerland	210	150	...	...	35	5	...	...	...	...	...	...	520
Syria	...	4	...	...	...	...	...	...	...	...	...	...	8
Turkey	...	25	...	25	...	33	...	...	...	...	...	...	698
Union of India	425	...	100	...	156	...	...	...	...	...	...	...	1,127
South Africa	1,064	1,105	135	205	252	246	3	12	6	73	4	...	7,784
United Kingdom	4,267	4,615	2,382	1,502	4,815	2,916	612	612	61	59	137	134	53,692
U. S. A.	8,050	11,305	1,652	1,552	10,283	10,358	767	1,175	...	...	789	1,372	98,247
TOTAL	32,099	33,599	7,749	6,318	34,303	30,394	1,759	2,245	459	376	1,068	1,654	326,981

Foreign Imports of Rubber in Long Tons

	Dry Rubber		Wet Rubber (Dry Weight)	
Singapore Imports from	March	April	March	April
Banka and Billiton	512	335	40	50
Brunei	142	104	2	1
Burma	...	2	...	...
Dutch Borneo	968	292	548	588
Java	218	30	...	...
North Borneo	1,199	904	33	30
Other countries in Asia	11	...	...	...
Other Dutch Islands	55	88	2	9
Rhio Residency	746	526	25	53
Sarawak	2,593	2,352	44	18
Sumatra	4,196	3,349	8,225	7,007
TOTAL	10,640	7,982	8,919	7,756
Federation of Malaya Imports from				
Burma	787	921	90	101
Siam	4,044	1,577	...	5
Sumatra	649	486	55	75
TOTAL	5,480	2,964	145	181

	(Tons)	
Dealers' Stocks		
Penang and Province Wellesley	9,430	10,533
Singapore	43,523	40,098
TOTAL	52,953	50,631
Port Stocks in Private Lighters and Railway Godowns		
Penang and Province Wellesley	5,565	4,865
Port Swettenham	1,082	1,298
Port Dickson	...	109
Singapore	11,022	8,468
Teluk Anson	390	485
TOTAL	18,059	15,225
Production		
Estates	33,616	28,142
Small holdings (estimated)	19,917	16,744
TOTAL	53,533	44,886

Carbon Black Statistics—First Quarter, 1949

Following are statistics for the production, shipments, producers' stocks, and exports of carbon black for the first quarter of 1949. Production, shipment, and inventory figures are compiled from reports made available to the Bureau of Mines by the National Gas Products Association and by direct reports from producing companies whose operations are not covered by the Association. Export figures are reported by the Department of Commerce, but are not fully comparable in a given month because of the lapse of time between loading and producing plants and clearance for export.

(Thousands of Pounds)

	March 1948	February 1949	March 1949	First Quarter 1949
Production:				
Contact types	56,286	51,585	57,212	165,083
Furnace types	49,714	47,917	53,784	151,415
TOTALS	106,000	99,502	110,996	316,498
Shipments:				
Contact types	46,673	48,429	47,615	142,717
Furnace types	47,351	49,749	54,224	151,324
TOTALS	94,024	98,178	101,839	294,041
Producers' Stocks, End of Period:				
Contact types	35,737	38,893	48,490	43,490
Furnace types	92,559	90,727	90,287	90,287
TOTALS	128,296	129,620	138,777	138,777
Exports:				
Contact types	19,624	19,310	22,034	60,986
Furnace types	9,326	7,112	9,366	25,804
TOTALS	28,950	26,422	31,400	86,772

SOURCE: Bureau of Mines, United States Department of Commerce, Washington 25, D. C.

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